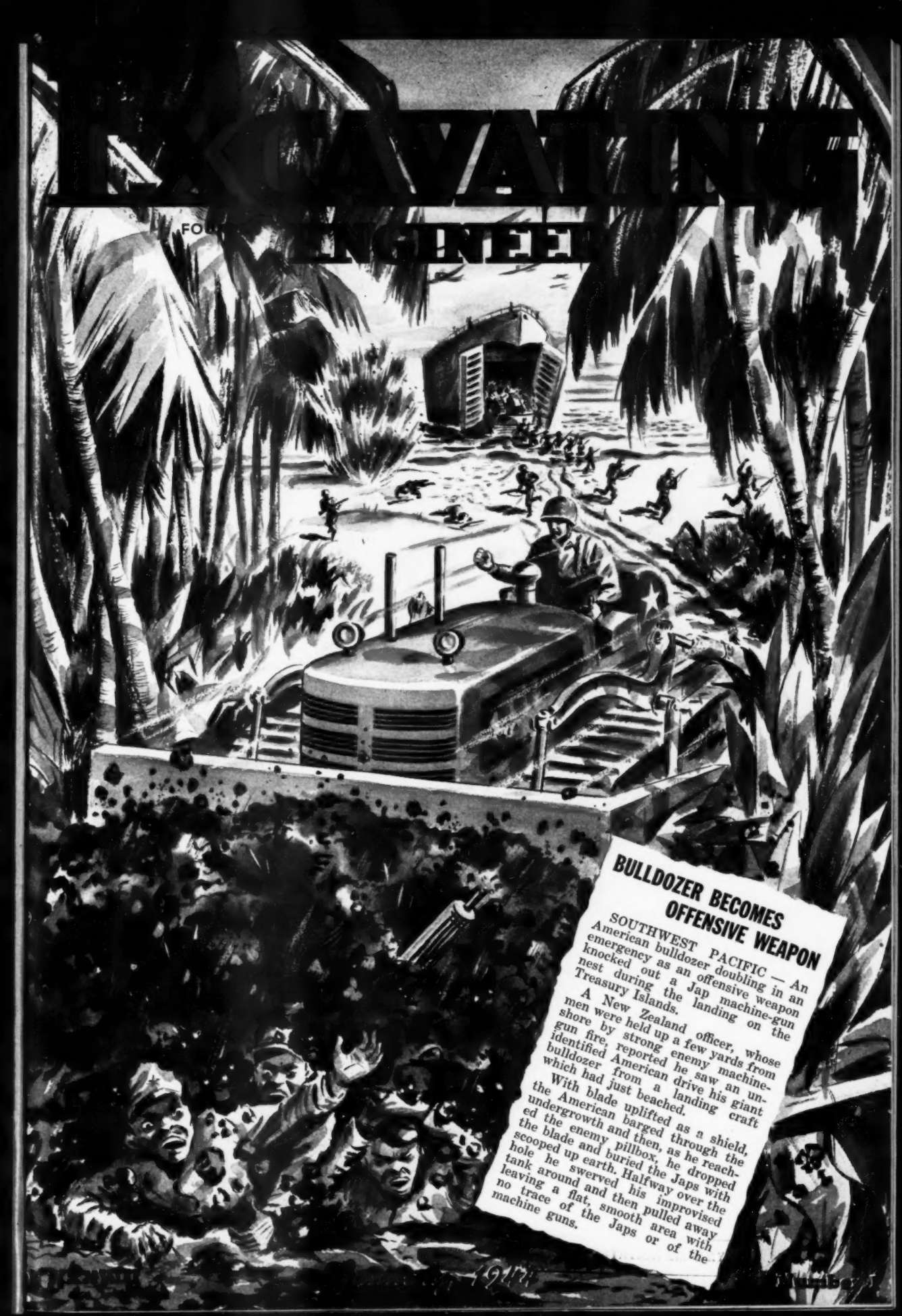
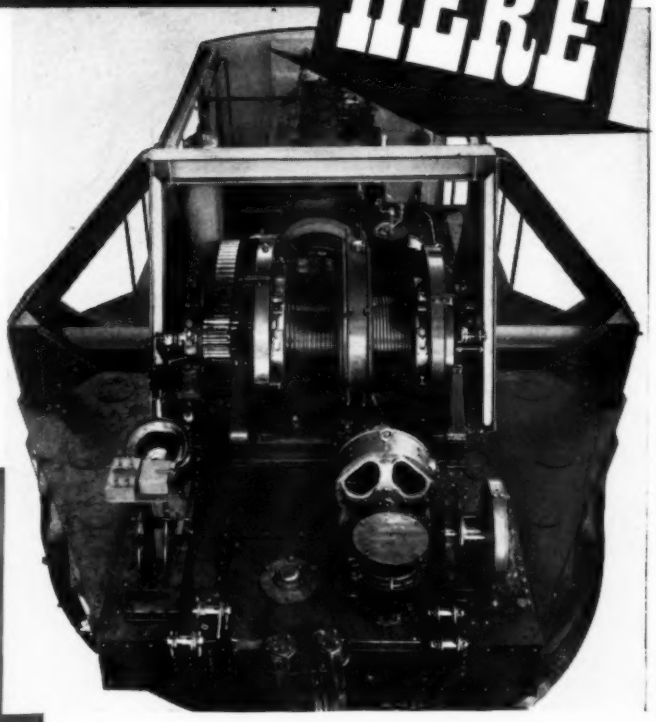

EXCAVATING
FOU
ENGINEE
BULLDOZER BECOMES
OFFENSIVE WEAPON
SOUTHWEST PACIFIC — An American bulldozer doubling in an emergency as an offensive weapon knocked out a Jap machine-gun nest during the landing on the Treasury Islands.
A New Zealand officer, whose men were held up a few yards from shore by strong enemy machine-gun fire, reported he saw an unidentified American drive his giant bulldozer from a landing craft which had just beached.
With blade uplifted as a shield, the American barged through the undergrowth and then, as he reached the enemy pillbox, he dropped the blade and buried the Japs with scooped up earth. Halfway over the hole he swerved his improvised tank around and then pulled away leaving a flat, smooth area with no trace of the Japs or of the machine guns.
1917

SIMPLICITY HERE

MEANS EXTRA YARDAGE EVERY SHIFT



Bucyrus-Monighan Walking Draglines have a simplicity of design that means real efficiency in all kinds of dragline work. Notice in the picture above how the machinery is located well back, to provide good rope leads and maximum counterweight effect. Notice the lack of complicated gadgets, gears or shafts. Bucyrus-Monighan simplicity means smooth performance and minimum maintenance, both in digging and in walking. Bucyrus-Monighans have proved their ability in all kinds of digging. They have the combination of speed and dependability to give the all-out performance we need for victory. They are manufactured with booms to 250 feet, buckets to 20 cubic yards.

G43-C

SOLD BY

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

In this MOBILE WAR-

Official Signal Corps Photos.

Ingersoll-Rand MOBIL-AIR AIR POWER

COMPRESSORS and TOOLS

ARE IN THERE FIGHTING!

MOBIL-AIR Compressors and tools are in there fighting! In this war our mechanized fighting forces have been carrying the battle forward a hundred miles in a single day . . . through mountains, deserts, or soggy swamps.

This means roads, bridges, bases, landing fields, gun emplacements, pill boxes, tank traps . . . all to be built or repaired within a miraculously short time.

That is why our Army Engineers are using MOBIL-AIR Portable Compressors and Air Tools in practically all combat, reserve, and supply zones. That is why this same compressed-air equipment is also being used by the armed forces of our allies.

Because these machines frequently operate under fire, they are considered combat units. They must be able to take it, and that is just what they are doing today — from frozen Alaska to the scorching deserts.

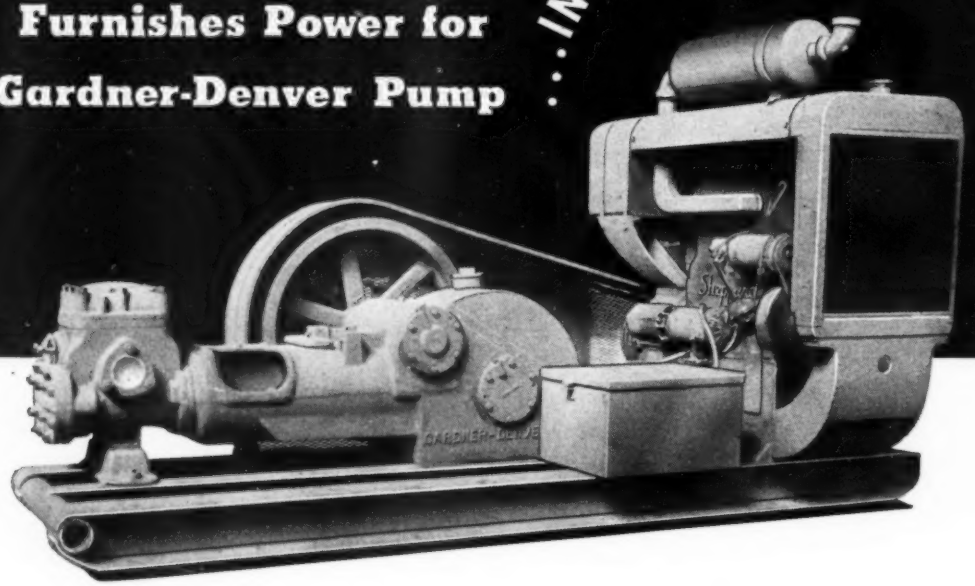
Ingersoll-Rand
11 Broadway, New York, N. Y.

2-236

CENTRIFUGAL PUMPS • CONDENSERS • COMPRESSORS • TURBO BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES

THESE "CIVILIAN SOLDIERS" FORM A RELIABLE COMBAT TEAM

Sheppard DIESEL Furnishes Power for Gardner-Denver Pump . . . IN RUGGED FOREIGN SERVICE



WITHOUT the aid of a dependable power unit, Gardner-Denver pumps couldn't provide the steady, dependable operation necessary for gruelling military and lend-lease service. Pumps and power units must both be built to stand the terrific punishment of continuous duty—pumping oil, water, kerosene, etc., under conditions which are encountered only in wartime.

The precision-manufactured Sheppard Model 6A Continuous Duty Diesel which powers the 95 GPM unit shown above will develop 25 H.P. at 1200 RPM . . . 24 hours a day . . . seven days a week.

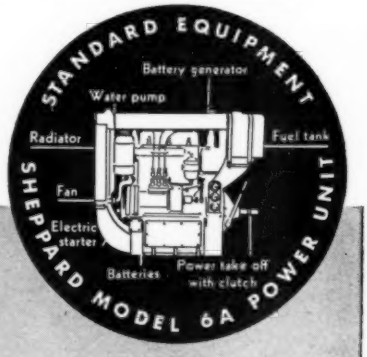
Oil cooled pistons, hardened, replaceable cylinder liners, 4% (closer if required) governor regulation device—products of skillful engineering—make Sheppard Diesels the most economical source of power to use and maintain. The simplified Sheppard fuel injection system is added insurance of continued efficient operation.

Sheppard Diesels are delivered complete according to specifications . . . ready to run without makeshift additions. They are compactly designed for easy installation in new equipment or to convert more costly, less efficient power installations to the economical use of Diesel.

☆ ☆ ☆

While we, too, are devoting most of our energy to the war effort, we are looking forward to the time when we can again supply enough engines to meet the demands of our customers. In the meantime, Sheppard engineers will be glad to plan your post-war power requirements with you. Write for information and illustrated data sheet on the Sheppard Model 6A today.

R. H. SHEPPARD COMPANY, HANOVER, PA.



Sheppard ALL AMERICAN DIESELS

Transportation
EXCAVATING ENGINEER
FOUNDED 1905

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HAISS

BIGGER PAYLOAD BUCKETS

For TRENCHING ..the Narrow-bowl HI-POWER in ½ and ¾ yd. sizes is a master workman.

For EXCAVATING . . a full line of HI-POWER Buckets with variable reeving for up to 7:1 closing ratio.

For REHANDLING . . the Haiss MULTI-SHEAVE in a full range of sizes. Fast, sturdy and long lived.

Haiss has the right bucket for your particular job, engineered all the way to give you bigger pay-loads through improved design and construction. A Haiss Bucket gives your crane a chance to break its own best performance records. Every Haiss Clamshell is built to do its particular type of work better. Fifty years of skill and experience in manufacture back it up.

★ *Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.*

GEORGE HAISS MANUFACTURING CO., INC.
144th ST. & PARK AVE., NEW YORK 51

SWIFTER ROADS TO ALL FRONTS

Top, B-G Finisher constructing highway near airport in Egypt. Bottom, B-G Army Asphalt Plant in central plant set-up.

Mobility, America's secret weapon, is winning the war on all fronts. First demonstrated at the Battle of the Marne, World War I, when Paris garrison troops were moved by taxicabs to turn the German army.

Today, Allied motor convoys miles long travel hundreds of miles in a few days—a constantly shifting, hard-hitting force. The German Panzer units of Blitz fame are being out-blitzed on swiftly constructed highways and runways!

The U. S. Army Engineers who make these movements possible use modern construction equipment to build their roads, landing strips and bomber bases right up to the front lines. The same type of equipment that will provide a vast network of roads and airports after the war for civilian mobility — for business and pleasure. 44-1

BARBER-GREENE

AURORA, ILL.

We shot traprock across the luncheon table

Harding met me at the station, and I was mighty glad to sink down into the soft cushions of his big Jordan. That last 25 miles in the accommodation smoker had flattened me out. I was dog tired after a night on the sleeper and two hours' wait at the Junction. So — when he suggested luncheon at the club before going out to the quarry, I was more than willing.

Come to think of it, we never did go to the quarry!

Harding's letter had caught me at the office just as I was starting west, and it was so unusual that I had changed plans at the last minute, and had made this my first stop. I was all over the place in 1915, shooting Cordeau in pits and quarries from hell to breakfast. We thought we knew a lot about the stuff, but every shot taught us something new.

It's all according to the book.

Harding's case was fascinating! *He didn't dare use Cordeau!* Claimed he'd loaded a row of 5-inch "well drill" holes as usual, and hooked up with Cordeau according to directions. "It was a beautiful blast," he said, "but when the dust settled there wasn't even a buffer left at the face! That rock was all over the quarry — in fact, I got complaints from the next county!"

"What are you shooting?" I asked.

"Traprock," he replied. "We're taking out the eastern end at a 50-foot face, working back one row at a time. Put down about a dozen 5-inch 'well drill' holes subdrilled 3 feet, with a burden of 18 feet and spaced 14 feet apart. Oh, it's all according to the book," he added, with a laugh, "my blaster's a good man."

"What do you use?" I asked.

"75% bottom load with 60% top load."

"And decks?"

"No, but we use two blasting caps in each hole, with all holes hooked up to go at once."

"Have any trouble before using Cordeau?"

"None whatever. Good fragmentation, and easy digging for the shovels. But now, I gotta hire a snow plow . . . "

"Don't blame Cordeau for that," I remarked. "The fault probably lies in your loading. . . . Oh, I know you followed the book, but think a minute. . . . Suppose every cartridge in every hole had a cap in it? Would you get *more* or *less* work from your explosives . . . ?

"We claim you'd get *more* . . . enough more in your case to blow your traprock all over the county! The line of Cordeau extending from the bottom to the top of each hole acts as a detonator for every cartridge in the load. Thus, each cartridge goes with the added force of a primer cartridge.

"Try Cordeau again — this time with 60% in the bottom and 40% in the top."

Harding grinned — and called the waiter.

"The least I can do to repay your favor is to drive you to the Junction," he said. "I'd like to have you run out to the quarry, but we won't be ready to load for a couple of days. When we do shoot it will be with Cordeau . . .

"The Limited goes through at 6:50 — we can just make it . . . "

That was 28 years ago, and he's used our detonating fuse ever since. In 1940 he switched to the new Primacord — it does everything that Cordeau did, but does it better. Its powerful charge of P E T N must be detonated with fuse and cap or electric blasting cap; its tough flexible textile covering is strong, water-resistant and light in weight.

Yes, sir, you'll get *more work* from your explosives when you hook up and detonate with Primacord.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut

PRIMACORD·BICKFORD
Detonating Fuse
Also Makers of Ensign-Bickford Safety Fuse — since 1836

39 NORTHWESTS

Thirtynine Northwests for Walsh Construction Co. and Geo. F. Driscoll Co. New York, N. Y.

Steadily year after year the list of Northwest repeat order buyers increases and steadily the number of repeat orders they buy gets larger. Though the association of contractor's names change, the new organization continues to buy Northwests.

Not so long ago Walsh Construction Company and Geo. F. Driscoll Company of New York added their 39th Northwest to their fleet. This is doubly significant when you remember that Walsh Construction Company bought one of the first 100 Northwests built.

Outfits like this don't make mistakes in the purchase of equipment. They are proving Northwests under wartime conditions.

The high quality of service Northwests are giving the leading contractors of the country is the best possible guide to your own equipment purchases after the "Duration."

Let's get acquainted. Let us send you literature on the size shovel, crane, dragline or pullshovel you are interested in.

NORTHWEST ENGINEERING CO.
1730 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.

GASOLINE • ELECTRIC • DIESEL • OIL

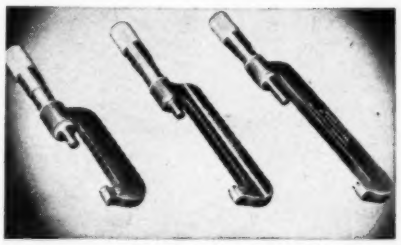
Built in a range of 18 SIZES ⅜ yd. capacity and Larger

Top: 822-Q "Two Unit" Quarry Plant.
293-Q Quarry Plant.
Bottom: 880 Senior Dual Crusher Gravel Plant.
285-W Gravel Washing, Screening and Crushing Plant.

CRUSHED rock and gravel—in tremendous volume—is essential ammunition in the present war. Roads must be built in days instead of months, and concrete structures must literally spring from the ground. The speed with which this work is done is a typical case of American-built equipment giving important advantages over the enemy.

On every front, Universal crushing plants and rock and gravel crushers have speeded up the work. On the Alaska Highway, on South Pacific islands and elsewhere, they have established production records and functioned faithfully with minimum maintenance, so important in emergency construction. On the home front, Universal crushing equipment has done its share in the rapid building of access roads, runways and other military installations.

Universal is also producing pulverizers for fertilizer and explosives plants, and we are making a direct contribution to the war effort in the production of army ordnance equipment which we have been called upon to build. At right are gages made in our toolroom for use in producing precision parts in our shops.



UNIVERSAL ENGINEERING CORP.

610 C Avenue W., Cedar Rapids, Iowa

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

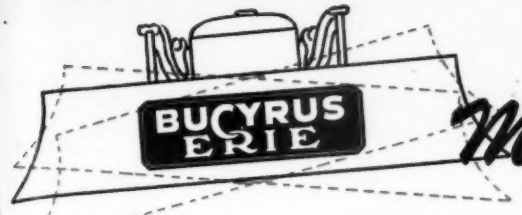
Sinews of Shipbuilding

Wire rope is the sinew of shipbuilding. In small electric hoists in machine shops, in giant cranes that pick up a turbine or gun turret and swing it into position, wire rope is the linkage which makes possible smooth and rapid handling of materials and sub-assemblies.

Bethlehem is supplying a tremendous amount of wire rope to shipyards. Powerful dredge ropes to keep open wet basins and launching basins . . . crane ropes of all sizes . . . ropes to lift, pull, and guy . . . and ropes for the thousands of rigging jobs on the vessels themselves.

Enormous as is shipbuilding's total wire-rope demand, it is in addition to the vast quantities needed in war plants, oil fields, mines, quarries and transportation. Bethlehem's wire-rope mill is working full-tilt to supply war needed wire ropes for military and naval applications, and essential uses on the home front.

BETHLEHEM STEEL

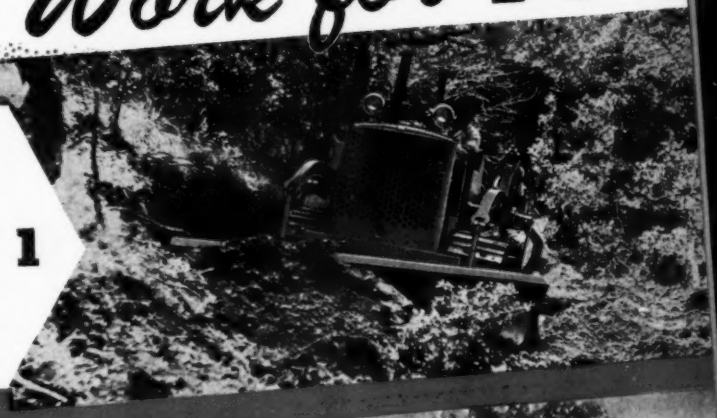


Make the TILT Work for YOU

One man can tilt or angle the blade on a Bucyrus-Erie Bullgrader in just a few minutes time without assistance. That's why it's so easy to take advantage regularly of blade tilt to do your work in the fastest and most efficient way possible. Here's how you can use the tilt:

WHEN TRACKS MUST TRAVEL ON A SLOPE AND YOU WANT TO ESTABLISH A LEVEL CUT: Tilt in with the advance corner low, which starts a leveling cut and throws the material out along the angled blade, overcasting the excavated material. As tracks move onto the section you have notched into the bank and filled on the slope, continue with the tilted blade only long enough to get tracks on the desired grade level. Then adjust back to a level blade but continue to lead with the inside corner in order to plow the material out to fill on the side slope.

1



WHEN TRACKS MUST TRAVEL ON THE LEVEL AND YOU WANT TO ESTABLISH A SLOPING CUT: With front corner tilted down, take a cut along the centerline of your ditch until you have a track length. Then level the blade and, working your tractor on the slanted bank, continue to angle your material up the slope and into your spoil pile. If you are opening a V-ditch, repeat on the opposite side at proper slope to make the desired cut.

2

PEELING (OR SLOPING DOWN) VERTICAL OR STEEP BANK: Tilting the forward corner of the blade up and raising it high, use the end to "peel" or shave off the material. Continue the operation until you bring the bank to the desired slope, or until you have a slope on which the tractor can operate.

3

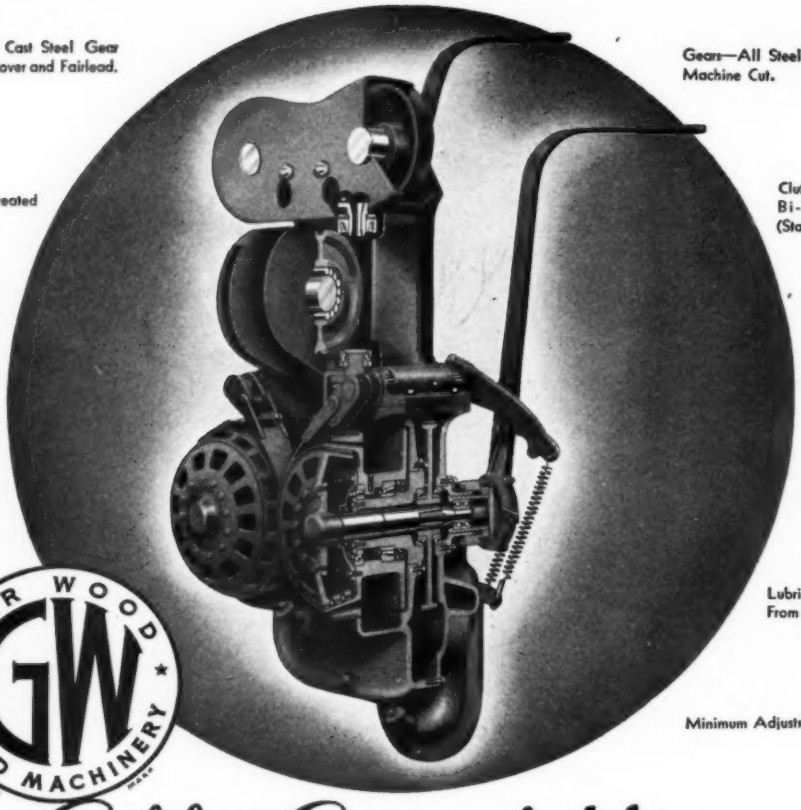
Find out about the complete line of Bucyrus-Erie Tractor equipment from your nearest International TracTracTor distributor. There are blades, scrapers, rippers, rollers, and grubbers that will give you speed and economy.

In all blade work, reduce backing up moves whenever you can. Plan c possible work to dig both ways not only to apply more of your tir to moving dirt, but also because excessive back-up makes for excessi tractor maintenance.

N-

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR
INTERNATIONAL TRACTRACTOR
DISTRIBUTOR


Heavy Cast Steel Gear Case, Cover and Fairlead.
Gears—All Steel—Machine Cut.
All Shafts Heat Treated and Ground.
Clutch—Cone Type with Bi-Metallic Facing (Standard Equipment).
Bearings—Ball and Roller.
Brake—Servo—External Band Type—Low Drag.
Large Sheaves.
Ventilated—Clutch and Drum.
Lubrication—Automatic From Gear Case.
Minimum Adjustments.

GAR WOOD GW ROAD MACHINERY

Cable Control Units

GIVE OUTSTANDING PERFORMANCE

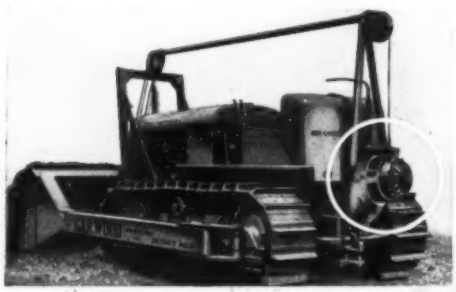
Features provided in the simplified "Clean-Cut" design of Gar Wood Cable Control Units make this "top" performance possible.

GW Road Machinery operated by Gar Wood Cable Control Units is a component fighting unit in the United Nations' drive for Victory!

SPECIFICATIONS

Cable Capacity (½"—6 x 19) Per Drum	185,
Line Pull—Bare Drum	7500 Lbs.
Line Pull—Full Drum	4530 Lbs.
Line Speed—Bare Drum (1-2-5 Trans. Gear)	270 Ft. Per Min.
Line Speed—Bare Drum (3-4-6 Trans. Gear)	433 Ft. Per Min.
Line Speed—Full Drum (1-2-5 Trans. Gear)	477 Ft. Per Min.
Line Speed—Full Drum (3-4-6 Trans. Gear)	718 Ft. Per Min.

The GW Road Machinery Line is Complete—Consisting of both Hydraulic and Cable-Operated Units



Gar Wood Bulldozer operated by SINGLE-DRUM Cable Control Unit.

Gar Wood earth-moving Scraper operated by GW DOUBLE-DRUM Cable Control Unit.

BONDS SPEED VICTORY

ROAD MACHINERY DIVISION

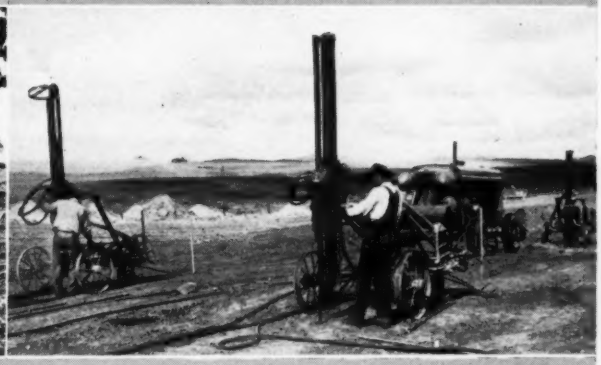
GAR WOOD INDUSTRIES, Inc.

DETROIT 11, MICHIGAN

GW ROAD MACHINERY is Sold Through **ALLIS-CHALMERS** Dealers Everywhere

Cuts and fills are common on the Madera Canal on its route through foothill country from Friant Dam to the agricultural lands of Madera County. This Caterpillar tractor and LeTourneau Carryall is but one of numerous units of heavy earth-moving equipment in use by Larsen Bros. and Harms Bros., to cut a pathway for water.

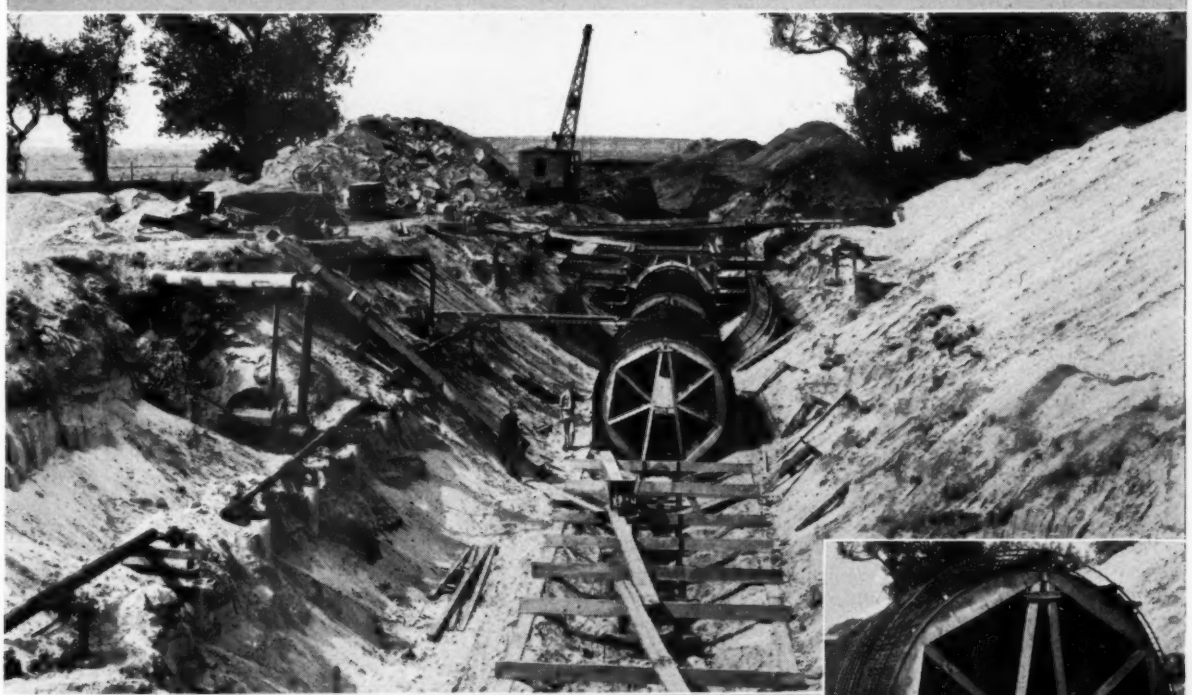
After overburden is stripped from a rock section of the Madera Canal right-of-way, wagon drills move in to prepare the way for dynamite. (It has been a long time since an iron-tired wagon drill appeared on a Central Valley Project job.)

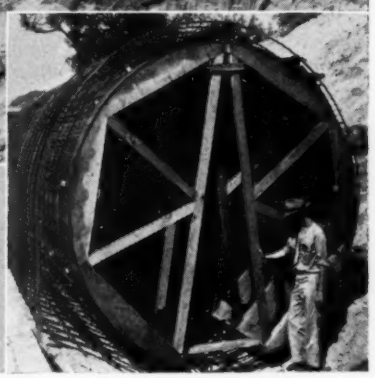


Water for Wartime Food

THE PROGRAM OF the United States Department of the Interior and the Bureau of Reclamation is under way on many fronts to increase the wartime food supply for the Allied Nations. On the Friant division of the Central Valley Project in California dirt and rock are being moved to make way for the concrete and steel of an additional section of the Madera Canal. (The Bureau received bids on the final section of the Canal last month.)

Under an emergency wartime food producing program, the completed canal will make water available to more than 25,000 acres of Madera County land not now irrigated. The 11-mile section of canal under construction is being built on two schedules. Larsen Bros. and Harms Bros. of Inglewood are building the Fresno River siphon and adjacent structures.

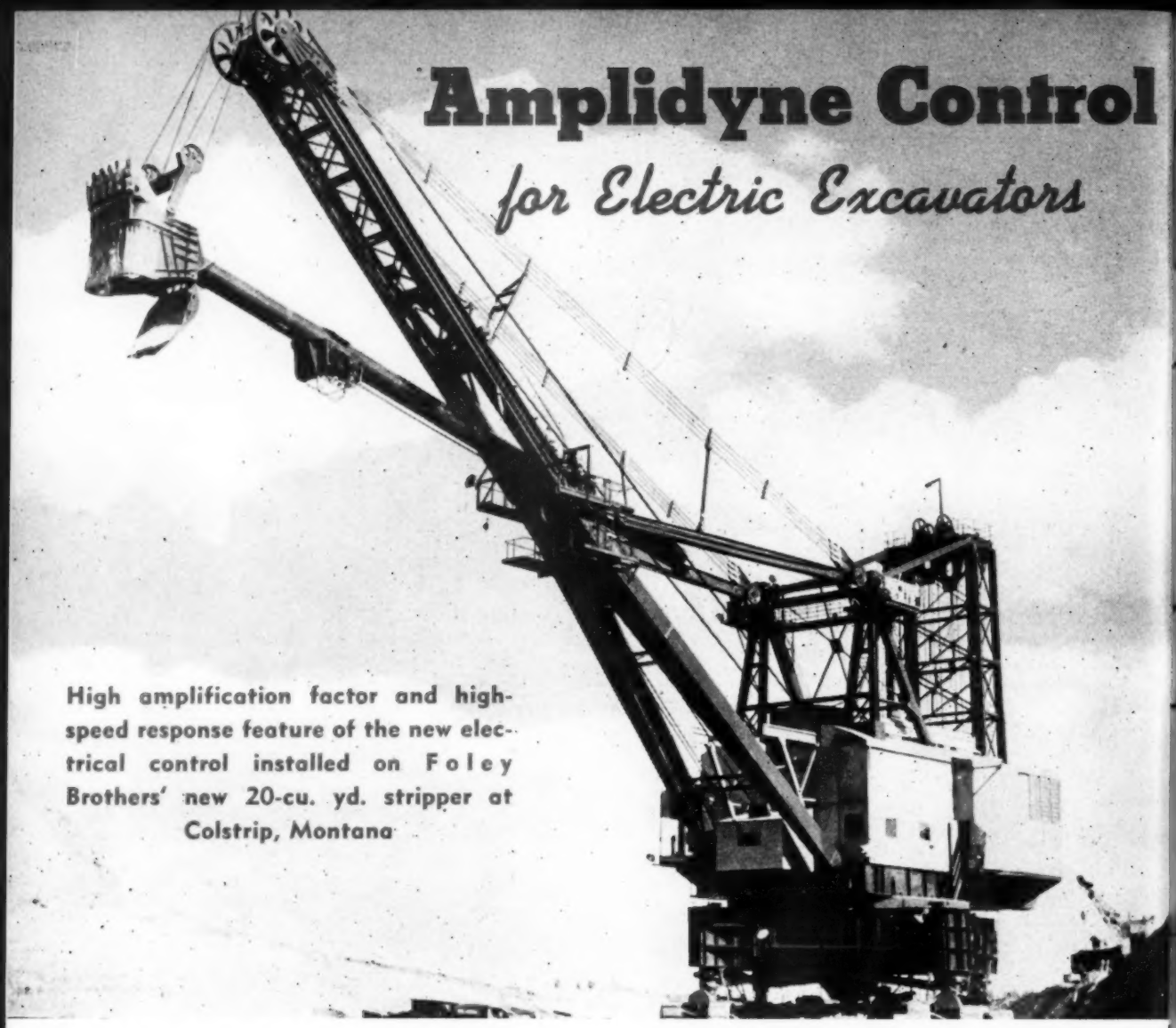




Above:—Forms for the Fresno River siphon on the Madera Canal take shape rapidly as the contractor races to get this portion of the Madera Canal in the clear before the winter rains turn the river into a raging torrent. The well-points along the left side of the excavation enable the contractor to form and pour the siphon barrel in the dry. Right:—An internal form and reinforcing steel in place for a section of the monolithic siphon carrying the Madera Canal under the Fresno River. The siphon is 10.5 feet I.D. and its length, including transition sections, is 1025.5 feet.

Amplidyne Control

for Electric Excavators



High amplification factor and high-speed response feature of the new electrical control installed on Foley Brothers' new 20-cu. yd. stripper at Colstrip, Montana

IN LINE WITH A policy adopted when they pioneered open-pit coal mining in the Rosebud Coal fields at Colstrip, Montana, in 1923, Foley Brothers is again leading the way with advanced type of excavating equipment. The latest equipment, installed last spring, is a Bucyrus-Erie 1050-B, 20-cu. yd., stripping shovel with a 133-foot boom and a 90-foot dipper handle. This stripper is the first Bucyrus-Erie shovel to incorporate complete amplidyne control, the important recent electrical development that is helping modern electric excavators to produce greater output at lower cost.

Back in 1929 Foley Brothers installed a Bucyrus-Erie 750-B 13-cu. yd. stripping shovel and a Bucyrus-Erie 200-B 10-cu. yd. loading shovel. The stripper had a 120-foot boom and 90-foot dipper stick and was claimed to have the longest operating range of any shovel in the world at that time. The 200-B was also claimed at the same time to be the largest coal loader in the world. It had a 68-foot boom and a 48-foot dipper handle.

The new 1050-B stripping shovel, the longest reach and highest lift shovel in the world at the present time, was Foley Brothers' answer to a challenge to increase coal production at Colstrip. Amplidyne control was adopted for the field of the synchronous MG set motor to smooth out the incoming power voltage because Colstrip is at the end of a long power line. Amplidyne control on the d.c. generators gives the Foley Brothers' stripping shovel a high-speed response which increases production through better control of "overshooting" and underpower through fast, forcing action.

By D. STOETZEL
(Electric Shovel Specialist, Industrial Engineering Division, General Electric Company)

• Foley Brothers' Bucyrus-Erie 1050-B 20-cu. yd. electric shovel equipped with amplidyne-type control for hoist, swing and crowd motions and power-factor regulation for the synchronous motor on the MG set at the open pit mine at Colstrip, Montana.

Paired with the new Bucyrus-Erie 1050-B stripper at Colstrip is a Marion stripper converted to a 15-cu. yd. loader also equipped with amplidyne control and amplidyne power factor regulation. The Bucyrus-Erie 750-B stripper and 200-B loader are still being used in the mine. A Marion dragline with an 8-cu. yd. bucket is being used to strip end cuts in the mine and a Bucyrus-Erie 120-B dragline with a 5-cu. yd. bucket is used

for re-handling excess overburden when necessary.

The Amplidyne

Similar in many respects to a conventional motor or generator, the amplidyne (Fig. 2) utilizes the well-known parts of direct-current machines such as brushes, field windings, armature, commutator, bearings, field frame, etc. However, its circuits (both magnetic and electrical), and its operation and characteristics are quite different from those of the ordinary d.c. machine. The range of ratings usually encountered is from 200 watts to 25 kw, but ratings up to and including 60 kw have been placed in successful operation. Ratings from 1 to 5 kw are usually used when applied to electric excavators. The rating of the amplidyne needed depends on the maximum field excitation required by the shovel generator, which, in turn, is more or less a function of the generator kw rating.

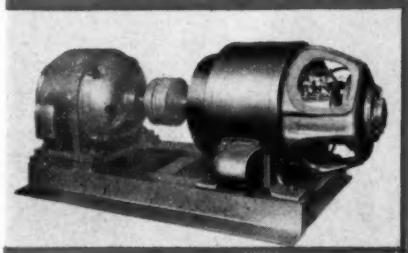
How It Works

The amplidyne is a cross flux, or armature reaction excited type of machine. The conventional 2-pole generator (Fig. 3), has one set of brushes. In the amplidyne (Fig. 4), the one set of brushes is short circuited and another set of brushes in quadrature, is added. The load is taken off at this new set of brushes. In the operation of the amplidyne, the primary excitation applied produces a small flux through the armature in a horizontal direction as shown in Fig. 4. This flux is sufficient to cause a relatively large current to flow through the short-circuited brushes. The armature reaction set up by this current produces a relatively heavy flux through the armature as indicated in a vertical direction. This flux produces a relatively large voltage times current output at the second set of brushes (on the horizontal axis). A compensating field is added to offset or neutralize the effect of the armature reaction of the load current flowing in the second set of brushes. Without the compensating field, this armature reaction would upset the already established flux relations which produce the desired output conditions.

High Amplification

It is apparent from the foregoing that a very small amount of primary excitation produces a relatively large current in the short-circuited brushes. This, in turn, produces a large armature flux and full capacity output voltage and current. In the conventional type of d.c. generator, the excitation power is in the neighborhood of one percent of the rated output power, varying from this figure considerably,

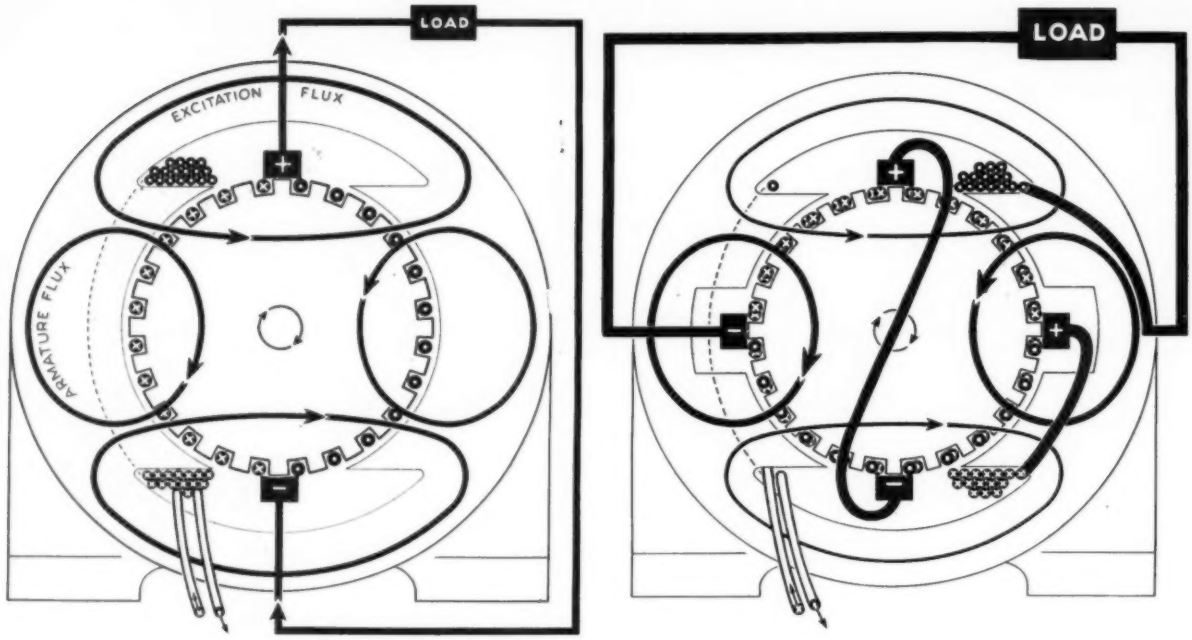
● Working in the pit of Foley Bros.' mine at Colstrip, Montana, are the Bucyrus-Erie 20-cu. yd. stripper in the foreground at the Marion 15-cu. yd. loader in the background.



● ABOVE: Typical amplidyne motor generator set, 3 kw, 1750 rpm. consisting of induction motor, 5 hp, 220 and 440 volts, Type K-254, and amplidyne generator, 3 kw, 250 volts, Type AM-610.

● RIGHT: Amplidyne power-factor regulator and control equipment on Foley Bros'. Bucyrus-Erie 1050-B electric shovel.

● BELOW: This 15-cu. yd. Marion stripper has been converted to a loader and is also equipped with amplidyne control and amplidyne power factor regulation.



• Left: Diagrammatic picture of the magnetic and electrical circuits of a conventional d.c. generator. Above: Diagrammatic picture of the magnetic and electrical circuits of a fully loaded amplidyne.

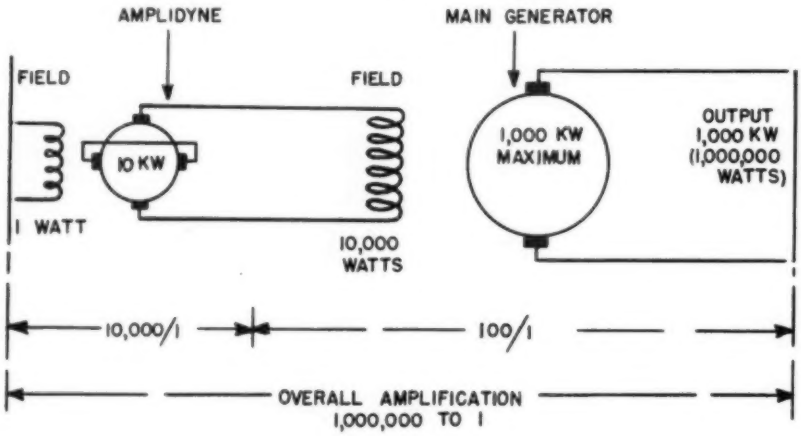
depending on the size of the machine and the characteristics that have been designed into it. In no case, however, do these variations even approach the 10,000 to 1 ratio between the output and the input power possible in the amplidyne. This high amplification factor (Fig. 5), is one of the outstanding characteristics of the amplidyne, a characteristic which makes it possible to use this machine in new schemes of electrical connections to accomplish results hitherto unattainable.

Since the amplidyne requires a very small amount of control power, there is no problem to finding sufficient space for a multiplicity of fields; therefore, many control fields, all wound on the same pole structure, may be used. The amplidyne responds to the resultant action of these fields, each of which may be adjusted easily by means of small resistors. Rectifiers and capacitors also may be used in the control circuits to produce certain desired results. The small amount of power involved makes possible the adjustment of the fields over a much wider range than conventional fields. Also, the fields lend themselves to quick adjustment and automatic operation.

Speed of Response

Since the amount of primary excitation involved in the operation of the amplidyne is very small, it is possible to build up the required flux quickly. The second-stage excitation — that is, the armature reaction flux — is also built up rapidly — practically in phase with the armature current — because the current involved is large and the armature winding resistance and reactance is low. The conventional type of direct-current generator requires anywhere from a large fraction of a second to several seconds to build up its rated terminal voltage after full voltage is applied to the exciting windings. The time involved varies considerably with the designed characteristics and the size of the machine. The time required by the amplidyne to build up its output terminal voltage under the same conditions is a matter of a small fraction of a second, usually 1/20th to 1/15th of a second. Fig. 6 shows the speed of voltage build-up for a typical amplidyne. Note that the time is between three and four cycles of the 60-cycle timing wave.

• High amplification factor of amplidyne furnishing excitation to large d.c. generator is one of the outstanding characteristics of the amplidyne.



This high-speed response is the second distinguishing characteristic of the amplidyne and one which makes possible its use in all kinds of automatic control and regulating operations where fast changes in conditions must be met and compensated. The speed of response is so nearly instantaneous that it gives the amplidyne a forcing action by which extremely fast changes in output are accomplished. This forcing action when applied to the main generator fields results in faster response of the power output.

One of the many worthwhile accomplishments of the electrical industry is the sturdiness and reliability

that have been built into the rather complicated electrical-mechanical machine known as the d.c. generator. Size for size, the amplidyne is the equivalent of the heavy duty conventional d.c. generator and retains all of its desirable mechanical characteristics of solid, enduring construction that give long and trouble-free service. All of the important technique built up over a long period of years in connection with the construction of heavy-duty, direct-current machines has been brought to bear in the design and construction of the amplidyne. It is built with an enclosed, or semi-enclosed, housing so that it may withstand extreme conditions of dust, dirt, and moisture. It may be used any place where a direct-current motor or generator is used, under extreme conditions of vibration and rough handling. The amplidyne will keep on delivering its original characteristics year after year, giving unimpaired performance. Very infrequent brush replacement and periodic bearing lubrication are about the only maintenance items involved.

Many Applications

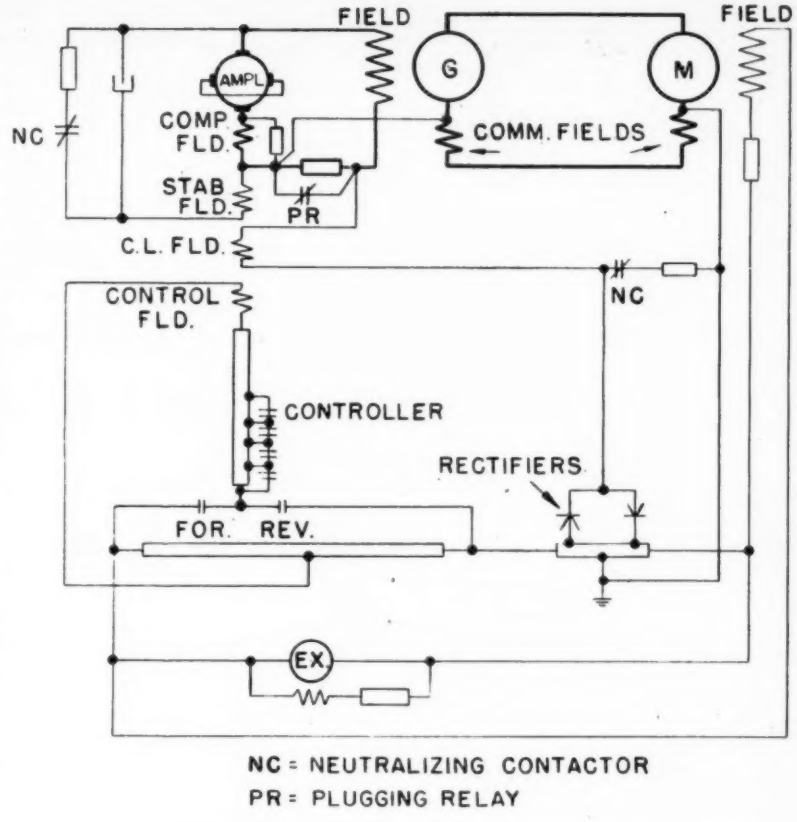
Amplidynes, in addition to their electric shovel applications, are being used in great quantities for military and naval requirements for planes, ships, and other machines of war. They are also being used for an increasingly large number of industrial applications, among which are: steel mill main rolls, steel mill auxiliaries, paper mills, all kinds of machine tool drives, reel or wind-up drives, large saw mill drives, arc furnaces, voltage, current and power factor regulators. The mining industry, in addition to the electric shovel has another outstanding application — mine hoists.

Practically all of the industrial applications are in connection with Ward-Leonard, or variable-voltage, drives. The amplidyne is used to furnish and control the excitation to the generator which supplies power to the large d.c. driving motor. The control schemes used are many and varied, depending upon the particular requirements of the application. They usually involve current-limit or voltage-limit control, or both, with reversing operation in response to multipoint controller positions. Special speed torque characteristics are almost invariably required; with the correct set-up of control fields and circuits, the amplidyne produces these to a nicety.

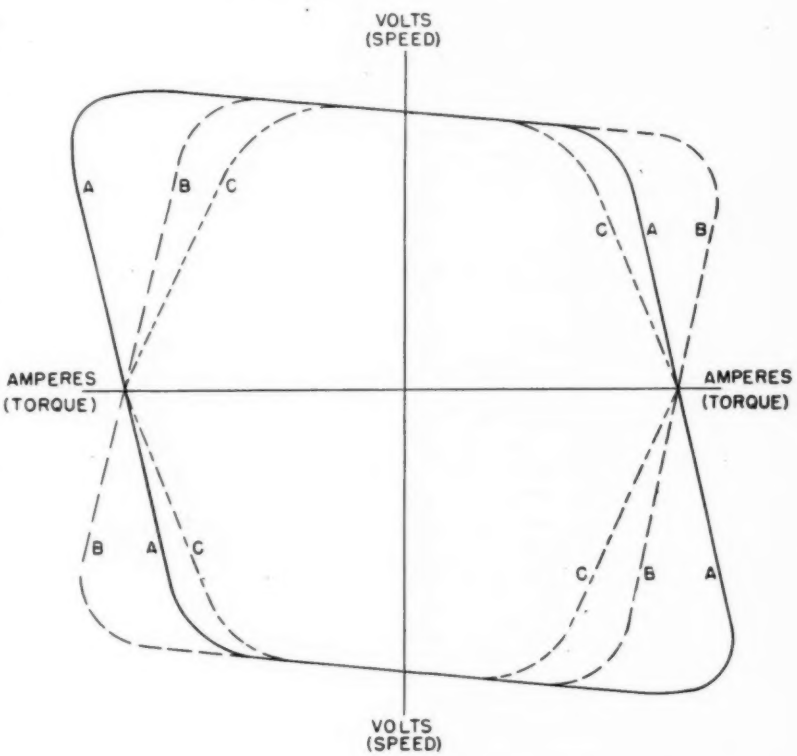
Electric Shovel Application

The variable voltage electric equipment on a modern power excavator,

(Continued on page 42)



• Above: Schematic diagram of the elementary connections for the amplidyne control as applied to one motion of an electric shovel. Below: Volt/ampere characteristics of an amplidyne controlled shovel generator.



Post-war Application of Tractor Equipment

* Arizona airport construction by Sidney Webb of Prescott.

Where, how and when to apply the economies of tractor equipment operation

THE DEVELOPMENT OF tractor equipment design, and the way its applications have increased during a single generation of excavating engineers, is one of the most remarkable and romantic stories of American industry. Twenty-five years ago the crawler tractor with its multitude of dirt-moving attachments was comparatively unknown in the field of excavation, though a small start had been made in a few states, notably California, and on certain specialized applications such as snow plowing and road maintenance.

Today, wherever architects and engineers set up plans for a new project, whether it is merely the building of a modest family dwelling or a huge hydro-electric power project such as Boulder Dam, tractor equipment demands consideration as an economical and effective means of digging, loading and transporting the excavated materials.

Originally conceived as a means of moving light materials on relatively short hauls, tractors have become increasingly powerful and versatile and, coupled with stronger and more effective digging and hauling equipment to go with them, have continually increased the effective applications in harder and harder materials and on increasingly longer hauling cycles.

By T. R. PAULSEN
(Bucyrus-Erie Company, consulting engineer, tractor equipment.)

Further, wider ranges of sizes, with increased variety of specialized auxiliary units, have greatly multiplied the uses for tractor equipment. Rare is the excavating project today which does not have a sizable yardage suitable for tractor equipment application.

Sizes of crawler tractors in the immediate postwar era will range, as in prewar years, from about 30 to 125 horsepower and wheel tractors applicable to dirt-moving will range from about 25 to 100 horsepower. And incidentally, we are likely to see an attempt to make greater use of wheel tractors in an effort to extend the range and speed of the limiting distance-factor in the hauling cycle. This increased application of wheeled tractors will not reduce the use of crawlers but will merely extend the use of tractors to more jobs.

Application of war experience will undoubtedly result in increased top speeds for crawler tractors, though this is not likely to be as radical in the

immediate postwar period as present speeds of tank crawlers might indicate to the layman. Tank crawler design is too cumbersome, complicated and expensive to be applied readily to the crawler tractor field. Also, the life of tank tracks is exceedingly short compared with our dirt-moving crawlers. Certainly tractor engineers will ultimately adapt and apply some of the principals of tank engineering to our track tractors, but this is not an immediate postwar possibility.

Bulldozers and Bullgraders

Dirt-movers will have available for application in the auxiliary tractor equipment line the standard units of prewar days, all of which will be improved in minor details by war experience, but probably with relatively little revolutionary change in design. No doubt there will, however, be a more competitive range of sizes in all lines. Units will include the universally applicable bulldozer and its more versatile companion unit with the angling blade, the bullgrader. Four wheel scrapers in all sizes and of improved models, will be more widely used than ever. The back-dumping two-wheel scraper will continue to be relied on (especially in combination with a dual unit bullgrader) as the "one - man highway maintenance gang." The self-powered scraper will see further development and more intensive competition. Various types of rippers, grubbers, and sheepsfoot rollers, as well as soil stabilizing units, will function about as usual.

Tractor wagons, hauled and self-powered, on wheels and on tracks, will continue to develop toward wider ranges of sizes and more efficient operation. Road graders and elevating graders will probably show some refinement but little basic change.

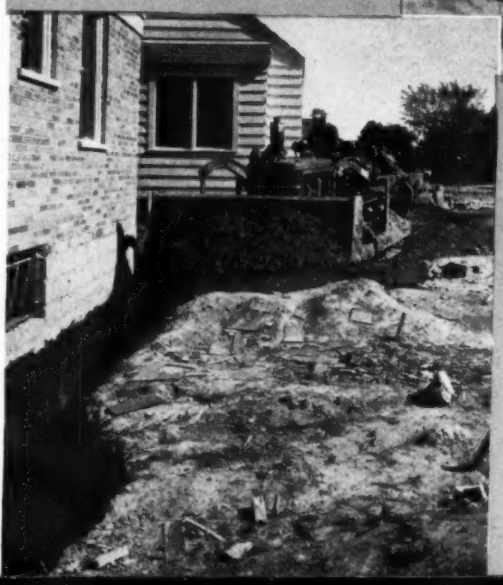
Tractor shovels will offer simplified and improved design, including modifications that will increase range of applications and utility. Tractor winches and cranes will continue to be available in various types suitable to specialized types of pulling and lifting; hauling jobs will use tailored units such as log-skidding devices and lumber-carrying arches, and there will be many more miscellaneous items of tractor equipment applicable to particular problems of construction such as the bullclam, overhead loader, cable trencher, side-boom and swing cranes, etc.

Widely applied in the highway and airport construction industries, tractor equipment is still serving only a small percentage of its ultimate applications in this and many other parts of the excavating industry.

Post-war Design

For instance, the capabilities of bulldozers and bullgraders for basement excavation have been applied in only a few localities. Where excavated material can be spread at the building site, this method shows revolutionary low costs and provides a very convenient method of segregating top soil for spreading after distributing and leveling the subsoil from the excavation. The whole job of basement excavation, backfilling, and preparation of the lot for landscaping can be done by one man with a bullgrader or bulldozer better, faster and at less cost than was formerly charged for the basement excavation alone. On some of our Bucyrus-Erie installations special portable loading ramps have been developed and have proved extremely successful and economical

• Capabilities of bulldozers and bullgraders for basement excavation have been applied in only a few localities. Above: Most of the excavating is handled by making cross cuts, piling material at the sides. After the center "saucer" is completed, long way cuts at right angles square up the excavation to provide straight walls and a level floor.



• Above: Big loads are carried up the steeply sloped banks and final squaring-up yardage is taken out on a ramp dug back into one wall. Left: The 'dozer returns to do the backfilling after foundation walls are placed. Balance of dirt piles are spread and graded, with the top soil, kept separate when excavated, distributed last for lawn and landscaping.

for basement excavation where material had to be trucked for dumping in other locations.

The Army, Marine Corps, and Seabees have demonstrated beyond question the efficiency of these tractor bullgraders and 'dozers in land clearing and building of pioneer roads and air fields. We are told that Guadalcanal could not have been held successfully had it not been for the heroic work of the Bullgrader operators who, under fire, put the airfield into operating condition in a matter of hours after the Japs had struggled for months to clear and grade it by hand methods. This story has been repeated again and again on airfields and highways in Africa, Sicily, and Italy, as well as in the Far East.

Bulldozers and graders have been applied with outstanding success in open mines, quarries, sand-and-gravel and brick-and-clay pits for maintenance of hauling roads, stripping, drainage, cleanup, etc. The road work is, of course, a "natural" for this equipment and pits can often apply the dual unit with scraper and blade combination to good advantage, especially where light stripping is involved. It has also been found extremely profitable to use tractor blade equipment to clean up and bunch up after the stripping and loading shovels so that these machines can keep steadily biting into the big bank where they can get high and profitable production.

• Loading with pushers permits lowering the hauling tractor's drawbar horsepower requirements on four-wheel scrapers from 2300 pounds per yard of scraper capacity to 1350 pounds. That means that with a pusher you can use a 10 to 15 yard scraper (struck measure) instead of a 6 to 10 yard scraper behind a 75 h.p. tractor (International TD-18, Allis-Chalmers HD-10, Caterpillar D-7, or Cletrac D-G). It isn't advisable to stretch the size of scrapers beyond the point of where you get a snappy load and fast haul. Even in easy digging it pays to hold to conservative ratios of yards to h.p.—ample h.p. cuts cycle time, eliminates delays, saves both tractor and scraper maintenance costs.

Used in Open Pits

Especially in these war times, both blades and scrapers have been used very successfully for scramming (cleaning out) the pockets and thin layers of ore left in some of the worked-out pit areas of the Minnesota Iron Range. It is safe to predict much more extensive use of tractor equipment for this type of work in the postwar period. With ramps for loading to trucks or cars, this operation can be carried on very efficiently and large tonnage recovered at very low costs.

In many sand and gravel operations, scrapers and blades can be used to obtain startling economies by loading over ramps or trapped bridges to conveyors which carry material directly to the screening plant. Incidentally, it is the writer's opinion that we are going to see a large increase in the use of conveyors for material transportation for fixed and semi-fixed plants during the postwar period.

Good Roads Lower Cost

With the trend of extensive use of truck and tractor types of equipment for hauling in open pits today, maintaining pit roads in perfect condition has become an operating necessity recognized by most progressive managements. Good roads permit faster haul, bigger loads, and materially reduce the maintenance of hauling equipment. Some large operators are

• Dual units are "handy men" around any job. They multiply the tractor's usefulness at a negligible cost for extra capital investment and fuel cost.

...draulic bullgrader ...eamed with cable-operated 4-wheel scraper.

• Bullgrader used with ripper.

• Bulldozer and ramping (sheeps foot) roller.

• The "One Man Gang" — hydraulic bullgrader and 2 wheel scraper.

• (1) Built to handle jobs like this, (2) the bullgrader-dozer pays its way in loading logs, (3) cleaning pits, (4) carrying loads, (5) bunching oversize, (6) or stacking bulk raw materials.

even building high grade paved highways into their pits and are showing a nice profit over the additional cost. If paved highways pay profits, surely then, any regularly used hauling road, whether it be of dirt, gravel, crushed stone or ore, rates regular maintenance with tractor equipment to keep it smooth, well-drained and solid for fast and economical hauling.

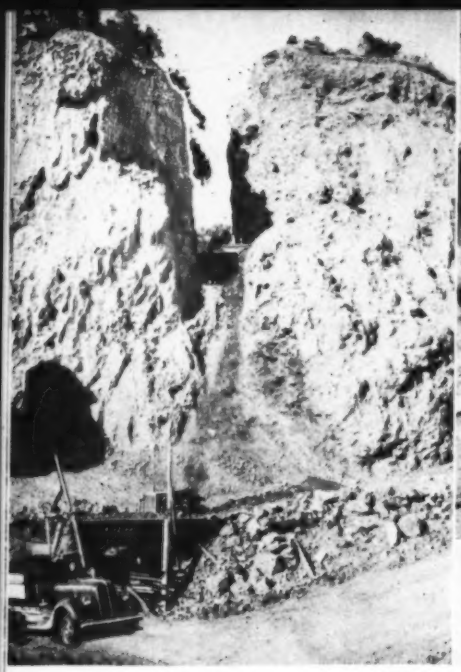
Applied to both pit roads and public streets and highways, the angling blade of the bullgrader is a wizard at snow and ice removal, and will pay winter dividends on this application. Where regular snowplow equipment is used, the bullgrader makes a very handy piece of auxiliary equipment when applied to opening side-hill roads and widening plowed lanes by pushing the snow and ice back off the shoulders.

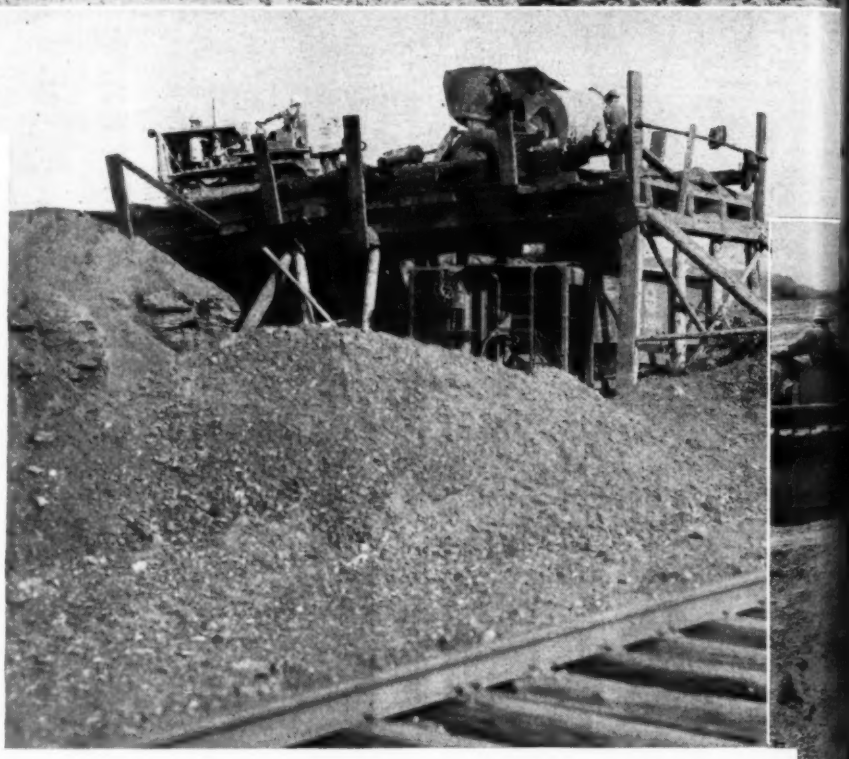
Scrapers vs Trucks and Shovel

Within the limits of suitable material and economic range of haul, the scrapers have three basic inherent advantages over the truck-and-shovel combination that make possible the revolutionary low costs they have introduced in the excavating industry. On short hauls, the scraper operator will make about the same number of trips as the truck driver on a unit carrying the same volume of dirt. While the truck is being loaded at the shovel, the scraper operator can self-load his unit. Haul, dump and return, on cycles in the tractor range, average out about the same as with trucks. Higher speeds are of course available with the trucks, but hauling road conditions, plus delays due to temporary ganging up of trucks at the shovel, will counterbalance this truck advantage.

The second point of advantage is the flexibility of the scraper unit. Each scraper is an independent operating unit and has no delays except those due to its own troubles. It loads and hauls continuously, subject only to interruptions due to its own mechanical failure or service problems. Further, it can load at any time any type material wanted on the dump,

• Railroad reconstruction, long neglected because of lack of operating capital, will again be a factor in the postwar excavating market. Tractor equipment will be found ideally suited for much of railway dirt-moving, as on this Nordvilli & Sons' job for the P. & L. E. R. R. near Monaca, Penn.





• The above picture of a mining operation at North Moccasin Mines Syndicate pit near Lewiston, Montana, illustrates the valuable versatility of tractor equipment blades. The Bucyrus-Erie TD-18 bullgrader in the cut above, channels the ore vein out of the cliff and dumps it over the slope. The bullgrader below picks up the ore and pushes it out over the loading ramp into trucks that are spotted below. This operation loads an average of 200 tons in a 7-hour working shift with this two-man crew. Note type of digging.

mixing gravel and clay, wet and dry, shale and loam, or whatever is wanted. A unit can be diverted at any moment to open a side road approach, or to widen or deepen a drainage ditch that is flooding working areas. While not a readily measurable factor, this unit flexibility is an important contribution to scraper economies.

The third fundamental advantage is the tractive advantage of the track tractor over the wheeled truck. This hauling track conditions the hauling roads, and materially decreases the loss of operating time due to weather conditions. Soft and slippery going ties up (and slows down) the truck fleet long before the tractor crews go back to their pinochle game. This tracking of the tractors is also important in packing the dumps and thereby reducing rolling and watering necessary if compact earth fill is important for quick paving and completion of the job. This is not only a time factor, but the finish grade on a tractor fill is easier to set and will stand up better than a truck-dumped fill where regrading after settling or special spreading and packing methods (and expense) must be used to achieve equivalent results.

About 2,000 feet is the present economical hauling range for four-wheel scrapers. Approximately 2,300 lbs. of drawbar pull is required for each yard of scraper capacity. A large part of this horsepower is essential only for the loading part of the cycle and it is therefore possible to reduce the

• Two-wheeled scrapers dump from this trestle to load scrammed ore to cars on the Mesabi Iron Range for Oliver Iron Mining Company, Hibbing, Minnesota.

• The Bucyrus-Erie Dozershovels have been in use on the war fronts for some time, but just recently they were made available for essential civilian use. After the war they'll be available to all.

• At the pit of E. W. Combs Co. at Hibbing, Minnesota, gravel is loaded to the conveyor of the screening and washing plant by a tractor blade at remarkably low cost. "Troughing," illustrated here, has long been recommended to operators as a means of increasing load-carrying capacity.

• Easily moved and quickly assembled, the portable loading ramp to the left permits trucking of basement dirt loaded by the revolutionary low cost bulldozing method illustrated on a preceding page.

power requirement of the tractor if pushers are used in loading. With pusher loading, only 1,350 lbs. of tractor drawbar pull is required on the hauling tractor for each yard of scraper capacity. The above drawbar pull will give an **average** hauling speed of about 1½ miles per hour under average conditions. This is not, of course, top speed for the tractor.

Haul and Return Speed

To go further into this question of speed, figuring in both haul and return, it is usually safe to figure 440 F.P.M. with excellent hauling conditions, 330 F.P.M. under fair conditions and 275 F.P.M. under poor conditions. These are over-all figures, including the allowance for loading, dumping and turning and are approximately applicable on a haul of from 500 feet to 1500 feet. Shorter hauls will, of course, reduce the average speed considerably, longer hauls will increase the average speed slightly.

Any calculations depend, of course, both on the mechanical efficiency of scraper and tractor units, balance of

(Continued on page 38)

• Below is another type of loading ramp. A natural gully is deepened to provide sufficient clearance and a bridge is thrown across with a trap, or grid, to permit material to pass through to hauling equipment below. In this picture a conveyor belt is used. A hopper accumulates and directs material which is brought in with a four-wheel scraper. Blade equipment can load from this type ramp just as handily, provided material is available on a relatively short haul.

• War construction of camps and industrial plants on a three-shift, seven-day week schedule, plus the proving ground of overseas battle operation has packed a decade of tractor equipment design and construction experience into the war years. You'll get more efficient, lower maintenance postwar tractor equipment as a result.

• Did you ever see a borrow pit that looked like the one below? This is a handy way to load trucks for long haul fill (use scraper loads for short haul). This loading chute can be quickly and cheaply built and is easy to knock down and move. A more permanent type of wheeled chute can be used on large yardage bank-loading installations, such as mines, or sand and gravel pits.

• First section of the double-barreled roadway between Worchester and Springfield, Mass., a part of the Brimfield Federal Aid Project.

Post-war Highway Planning IV

Summary of Excavating Engineer series of post-war highway planning articles indicates a good start has been made, but that many difficulties must be overcome and much work remains to carry plans for an adequate program to completed stage

A GOOD START HAS been been made by the state highway departments in bringing to contract stage post-war highway plans vitally necessary to uphold the highway construction industry's share of post-war economy in the United States. Information received from 35 state highway departments, that to date have answered an Excavating Engineer survey questionnaire on post-war highway planning, indicates that 27 states now have a total of $374,945,000 worth of contracts with plans ready, specifications drawn up, legal details taken care of, and ready to be put into work shortly after peace-day, or as soon as employment conditions warrant. Twenty-one states reported a total potential long-range post-war highway program of $1,685,793,370.

Post-war programs planned by individual states vary in size from one-year projects costing less than a million dollars to extensive three, five, ten and even 15-year highway and bridge construction programs costing up to $300,000,000. The potential long-range post-war highway construction program total of all states would give millions of man-hours of employment to returning servicemen and to those who will be forced to find other employment at the cessation of hostilities.

A state-by-state summary of the amount of post-war highway work now substantially ready for contract, the total amount planned for a potential post-war program, and the difficulties encountered by the various states in planning their post-war projects is contained in the tabulation on page 23. It is difficult, in summarizing the information received from the states, to give an accurate picture of conditions because the figures received from so many of the states are qualified by sundry circumstances. For a complete understanding of the situation as it exists in the respective states, it would be advisable to read the state-by-state reports printed in the October, November, and December issues of Excavating Engineer.[1]

The total potential post-war programs of the various states extend over varying lengths of time. For example, Kentucky prepared a 15-year program back in 1938 and Indiana's $160,000,000 post-war program is planned for over a period of 10 years. Although none of the other states that sent information indicated that they plan as long range programs as Kentucky and Indiana, it is quite probable that figures given by some of these other states may also represent long-range programs.

Practically all of the states heard from are experiencing some difficulties in planning their post-war programs. The common difficulty, reported by 23 states, and probably encountered by others that did not report the fact, is the lack of adequate personnel to carry to completion their respective post-war programs. An especial shortage is noticed among design engineers, draftsmen, and survey party personnel. To meet the difficulty of lack of personnel, California and Texas have set the pace by hiring older men, students on a part-time basis, women and girls to do drafting and survey party work.

California, Arkansas, and Massachusetts reported that they are busy working on access roads and flight strips for the present emergency and therefore do not have sufficient time, or enough additional personnel, to do as much work on completing post-war plans as they would like.

Minnesota and New Hampshire report lack of adequate financial aid as a difficulty they are facing in carrying post-war plans to completion. Some states are in need of enabling legislation to acquire right of ways. Arizona is faced with an especial problem because only five of the 14 counties in the state have county engineers. So it goes, each state is well aware of the importance of having post-war highway programs completed and ready for contract, but practically all have difficulties to overcome, some serious, before their post-war plans can be energized.

1. Editor's Note: Reprints of the Excavating Engineer post-war planning article series, prepared for distribution to the highway departments, are available as long as our small supply of the copies last.

• This recently completed Nevada highway is typical of access roads that will need to be constructed in that state in the post-war era.

• Top: Typical of new post-war work to complete in Arizona are roads like this section of the Superior-Miami highway in Pinal County. Below: This section of road through rock cuts on the Superior-Miami highway was similar to the highway pictured above before the improvements were made.

Some of the states have accomplished a great deal. In other states there is still need for a lot more work to be done. Every reader of Excavating Engineer interested in the highway construction industry, or in economical spending of tax money, should co-operate with their respective highway departments to insure a sufficient backlog of plans ready for contract, come peace-day, if another wasteful improvised relief program such as was experienced in the last depression is to be avoided. It might be wise for more states to follow the lead of Alabama, Connecticut, Missouri, Ohio, Oklahoma, and possibly others, and encourage the creation within their states of special highway advisory commissions, state-wide councils, and other groups to sponsor, encourage and assist in adequate post-war planning.

The war and the transition period to peace-time will form a definite pattern for future generations. There are huge needs for new construction

(Continued on page 45)

Summary of States Post-War Highway Planning

(Compiled from information received from 35 states)

STATE	Amount now Substantially Ready for Contract	Estimated Total Post-war Highway Program Planned	Difficulties Encountered in Preparing Program
ALABAMA	$ 6,000,000	Not Known	Shortage of survey parties and draftsmen. Lack of funds for obtaining right of way.
ARIZONA	$ 3,400,000	$ 50,000,000	Shortage of survey parties, draftsmen, bridge designers, etc. Only five out of 14 counties in state have engineers.
ARKANSAS	Not Known	Not Known	Shortage of personnel. Working on other projects.
CALIFORNIA	$ 10,000,000	$ 28,000,000+	Shortage of engineers. Busy working on access roads and flight strips.
COLORADO	NO INFORMATION RECEIVED TO DATE		
CONNECTICUT	$ 13,000,000	$ 243,000,000	None Reported.
DELAWARE	$ 250,000	Not Known	Shortage of engineers, draftsmen, etc.
FLORIDA	NO INFORMATION RECEIVED TO DATE		
GEORGIA	Not Known	Not Known	None Reported
IDAHO	NO INFORMATION RECEIVED TO DATE		
ILLINOIS	$ 25,000,000	$ 100,000,000	Shortage of engineers
INDIANA	$ 10,500,000	$ 160,000,000	Shortage of design engineers.
IOWA	NO INFORMATION RECEIVED TO DATE		
KANSAS	$ 10,000,000	$ 13,000,000	Shortage of engineers
KENTUCKY	$ 20,000,000	Not Known	None Reported
LOUISIANA	NO INFORMATION RECEIVED TO DATE		
MAINE	$ 7,500,000[2]	$ 15,244,000	None Reported
MARYLAND	NO INFORMATION RECEIVED TO DATE		
MASSACHUSETTS	$ 7,500,000	$ 37,500,000	Shortage of engineers, draftsmen, survey parties. Now working on access roads.
MICHIGAN	NO INFORMATION RECEIVED TO DATE		
MINNESOTA	Not Known	$ 20,000,000	Uncertainties as to financing. Additional federal aid desired.
MISSISSIPPI	$ 1,000,000	Not Known	Shortage of draftsmen. Lack of sufficient funds.
MISSOURI	$ 6,000,000	$ 22,000,000	Shortage of personnel.
MONTANA	Not Known	Not Known	None Reported.
NEBRASKA	$ 15,000,000	$ 75,000,000	Shortage of design engineers.
NEVADA	$ 6,295,000	$ 38,049,370	Shortage of adequate personnel.
NEW HAMPSHIRE	Not Known	Not Known	Lack of funds. Shortage of engineers.
NEW JERSEY	$ 35,000,000[3]	$ 70,000,000[3]	Shortage of engineers, surveyors and draftsmen.
NEW MEXICO	NO INFORMATION RECEIVED TO DATE		
NEW YORK	$ 50,000,000	$ 80,000,000	None Reported.
N. CAROLINA	NO INFORMATION RECEIVED TO DATE		
N. DAKOTA	$ 12,000,000	Not Known	Shortage of engineers.
OHIO	$ 18,000,000	$ 300,000,000	Shortage of engineers.
OKLAHOMA	$ 10,000,000	$ 100,000,000	Shortage of field surveyors and draftsmen.
OREGON	NO INFORMATION RECEIVED TO DATE		
PENNSYLVANIA	$ 25,000,000	Not Known	Shortage of survey parties and draftsmen.
RHODE ISLAND	Not Known	Not Known	None Reported.
S. CAROLINA	NO INFORMATION RECEIVED TO DATE		
S. DAKOTA	$ 8,000,000	Not Known	None Reported.
TENNESSEE	NO INFORMATION RECEIVED TO DATE		
TEXAS	$ 26,000,000	$ 100,000,000	Shortage of engineers.
UTAH	NO INFORMATION RECEIVED TO DATE		
VERMONT	$ 1,000,000	Not Known	Shortage of engineers.
VIRGINIA	$ 20,000,000	Not Known	None Reported.
WASHINGTON	$ 15,000,000	$ 130,000,000	No legislation to care for projects not on State Highway System.
W. VIRGINIA	$ 12,000,000	$ 19,000,000	Shortage of engineers.
WISCONSIN	Not Known	$ 70,000,000	None Reported.
WYOMING	$ 2,000,000	$ 15,000,000	Shortage of personnel.
TOTAL—	$374,945,000[4]	$1,685,793,370[5]	

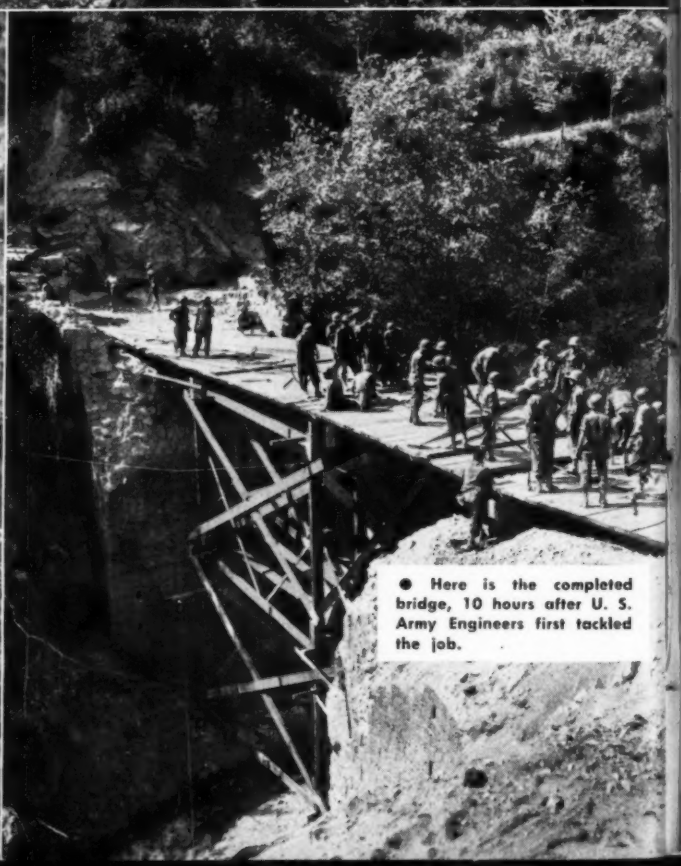
[1] Starting final check and acquisition of right of ways on this amount.
[2] Surveys and plans 10 to 95% complete for total in Column 2. We estimate 50% of this work now ready for contract.
[3] These figures are estimated as of April, 1944.
[4] This is an estimated total from information received from 27 states.
[5] This is an estimated total from information received from 21 states.

U. S. Engineers Rebuild Italian Bridge in 10 Hours

● When the Germans retreat they use every method they know to hamper the advance of Allied forces. Blowing up bridges is one method. The official U. S. Army Signal Corps Photos on this page show what happens when advancing U. S. Army units call upon Engineers to bridge a gap.

● The Engineers start their job of replacing a bridge which was fully blown out by retreating Germans in Italy between Battipaglia and Acerno.

● The uprights are in place and the spans are being laid.



● Here is the completed bridge, 10 hours after U. S. Army Engineers first tackled the job.

STARTING JANUARY 18TH

IT'S UP TO YOU!

STARTING January 18th, it's up to you to lead the men and women working in your plant to do themselves proud by helping to put over the 4th War Loan.

Your Government picks you for this job because you are better fitted than anyone else to know what your employees can and should do—and you're their natural leader. This time, your Government asks your plant to meet a definite quota—and to break it, *plenty!*

If your plant quota has not yet been set, get in touch now with your State Chairman of the War Finance Committee.

To meet your plant quota, will mean that you will have to hold your present Pay-Roll Deduction Plan payments at their peak figure—*and then get at least an average of one EXTRA $100 bond from every worker!*

That's where your leadership comes in—and the leadership of every one of your associates, from plant superintendent to foreman! It's your job to see that your fellow workers are sold the finest investment in the world. To see that they buy their share of tomorrow—of Victory!

That won't prove difficult, if you organize for it. Set up your own campaign right now—and don't aim for anything less than a 100% record in those *extra* $100 bonds!

And here's one last thought. Forget you ever heard of "10%" as a measure of a reasonable investment in War Bonds under the Pay-Roll Deduction Plan. Today, thousands of families that formerly depended upon a single wage earner now enjoy the earnings of several. In such cases, 10% or 15% represents but a paltry fraction of an investment which should reach 25%, 50%, or more!

Now then—Up and At Them!

Keep Backing the Attack!—WITH WAR BONDS

This space contributed to Victory by EXCAVATING ENGINEER

This advertisement prepared under the auspices of the United States Treasury Department and the War Advertising Council

Shots from the FIRING LINE

Mining Groups To Discuss Wartime Conditions

Wartime conditions of the mining industry will be discussed at a joint meeting of the Western division of the American Mining Congress and the Colorado Mining association in Denver on January 27th-29th. Current policies of the War Production Board and other agencies; anticipated requirements for the various minerals; metal prices and quotas; manpower supply; machinery and equipment for mines; stockpiling policies and legislation, and questions of mine taxation will be featured.

Construction Decline Releases 500,000 Men

The current decline in construction released about half a million men for other employment by the end of 1943, according to the War Manpower Commission.

Since the wartime peak of 2,190,000 men in the fall of 1942, construction employment has fallen steadily until it reached about 1,066,000 in the same period of this year. Labor market information indicates that the decline will continue to about 600,000 or 700,000 in January 1944, and to 500,000 or 600,000 in July, 1944. These estimated total employment figures for 1944 may be higher since some projects are behind schedule and there is also a possibility that layoffs on many of them are being postponed by reduction of long workweeks. However, the decline is inevitable even if its full impact is delayed.

Between July and November, 1943, more than half of 267,000 construction workers released were in areas of acute labor shortages, thereby facilitating their rapid reabsorption into industry. In addition, approximately 19,000 workers were released in areas anticipating a labor shortage, where the demand for male labor was strong.

In areas where the labor supply is adequate the War Manpower Commission is recruiting displaced construction workers for transfer. Unskilled construction workers are readily absorbed in a large number of war industries where the need for their labor is urgent.

Skilled and semi-skilled workers, the Commission states, can best be utilized in shipbuilding. Recent occupational studies show that 40 of the 90 construction occupations are to be found in shipbuilding and that the rest are closely related.

Many construction skilled personnel can also be used in aircraft plants, foundries and machine shops and for the skilled occupations common to all industries.

• International Harvester tractor hauls a "Long Tom" in the South Pacific area.

• This 2-cu. yd. diesel shovel is loading 10 cu. yds. of 55% iron ore into the Euclid dump truck spotted to the right of the shovel on the lower bench of Kaiser Company's Vulcan Mine near Kelso, California. The other truck is ready for loading. The Caterpillar tractor with bulldozer to the extreme left is cleaning up.

Plan Federal Agency to Supervise Road Building

A new Federal highway agency to be known as the "Rural Local Roads Administration" and to have supervision over Federal-state-local expenditures on local roads is called for in S. 1498 by Senator Stewart (D., Tenn.).

The proposed "Rural Local Roads Administration" would be independent of the Public Roads Administration and would be provided with $1,125,000,000 in Federal funds to be made available for construction of "all-weather" rural local roads at the rate of $375,000,000 a year for each of the three years immediately following the end of the war.

The measure provides that the Federal share of construction costs shall not exceed 75 per cent and mileage shall not exceed 10 per cent of the road mileage in each local jurisdiction, and the Rural Local Roads Administration shall prescribe standards governing designs, plans and construction.

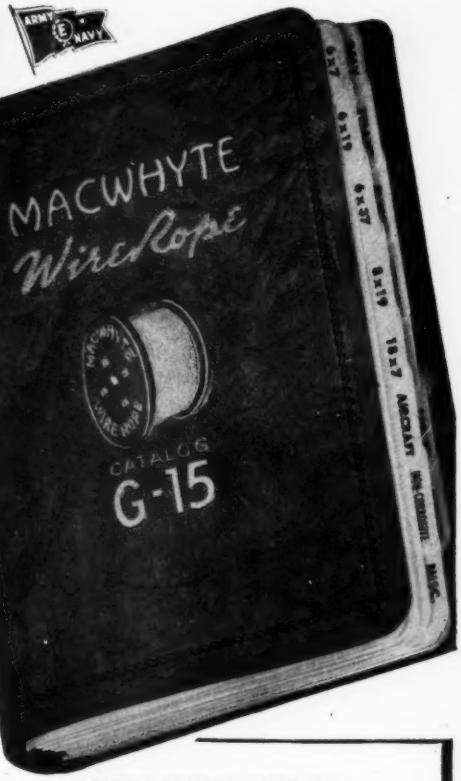
The Agency would be authorized to deal with "State highway agencies, county highway agencies, town highway agencies, township highway agencies, or any other local governmental highway agency" in construction of rural local roads.

Seek Used Equipment For Coal Stripping in England

Because of the critical coal shortage facing the United Nations, WPB's Construction Machinery Division issued an urgent plea for used earth-moving heavy equipment to be shipped abroad for new large-scale coal stripping operations in the British Isles.

Since 90 per cent of America's construction equipment now being built goes directly to the armed forces, the appeal was directed to general and highway contractors, used machinery dealers, State highway departments and

Ready Now!



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NEW TYPE GUIDE... Many New Features!

Inside the covers of this 160 page BUYERS' GUIDE are all the facts and figures you'd expect to find about wire rope, PLUS many that will surprise you. And it's completely indexed with visual tabs for quick reference. Here are only a few of many features:

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When you buy wire rope be sure to specify

MACWHYTE PREformed WIRE ROPE

• **American excavating equipment is busy changing the topography of Iceland. Here, a 2-cu. yd. shovel loads a Carryall in a gravel pit while two trucks are waiting for their loads.**
U. S. Army Signal Corps Photo.

municipal and county road commissions throughout the country.

The request took the form of an appeal to these sources to offer their used equipment for sale to the Procurement Division of the Treasury Department, which is acting as purchasing agent for the Office of Lend-Lease Administration.

The machines urgently needed are 250 Diesel or steam-powered shovels and draglines of one and one-half cubic yards capacity or more, and 100 Diesel-powered tractors with scrapers and bulldozers.

Coal mining experts have estimated that the shipment of this machinery, which would occupy some 20,000 tons of cargo space, would save 15,000,000 tons of coal shipping space this year and at the same time help ease a major drain on the tight coal situation in this country.

Coal stripping has long been a standard operation in the United States, particularly in the flat-land areas of Indiana and Illinois. In England, this form of coal mining had not been practised prior to this year, when vastly increased demands for fuel, plus a declining force of mining manpower, necessitated taking advantage of every possible means of increasing coal output.

Officials who have discussed strip mining with British experts anticipate that the quantity of the equipment requested will exhaust the available strip coal deposits of the British Isles within three years, but at the same time will supply approximately 45,000,000 tons of fuel for the use of the United Nations.

The advantage to be gained is, however, greater than is reflected solely by this amount of coal, since it is to be produced nearest to the point from which largely increased demand emanates. Coal will be needed in large quantities to support military operations on the continent.

New Pricing Practice For Leasing Equipment

A new pricing arrangement for leasing construction and road maintenance equipment to contractors by the War and Navy Departments and other Government agencies was announced by the Office of Price Administration. The action will relieve the Government of costs for supervisory personnel required for inspecting repairs.

Under existing regulations, the lessor must bear the expense of all repairs to leased equipment necessitated by normal wear and tear and the Army and Navy are required to inspect every repair made by lessees to determine the cause of breakdown and what propor-

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They used to churn butter by hand!

But today most of it is churned in mechanically revolved "barrels," with manual operations reduced to a minimum. A more uniform and sanitary product has resulted with obvious savings in man hours. MEVAC metered vacuum power control of all operations on the Buckeye Clipper outmodes tiresome tugging and pushing of levers in shovel operation.

Most Buckeye Clippers are "in uniform"—those built before the war and owned by contractors, mines, quarries, clay pits and industrial plants are almost 100% in war work and all those built since the war have been requisitioned by Uncle Sam for use by our fighting forces, at home and abroad.

When Buckeye Clipper convertible shovels with their vacuum power control get back into "civies" they can materially lower your excavating and material handling costs, at the same time increasing your daily yardages. The way they are performing today, under severe handicaps, in all kinds of climates from 120° in the shade to 30° below zero, often at the hands of green operators and frequently enduring long periods without maintenance are indications of what they can do for you.

Look ahead—send for Buckeye Clipper Bulletin 543 which takes the Clipper apart and shows you step by step why it will be the outstanding buy among ½ and ¾ yd. shovels.

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tion of the cost should be charged to the Government. The step provides for a simpler alternative method so that the War and Navy Departments can comply with OPA's controls covering rental of such equipment.

The Army and Navy proposed to OPA that they be allowed to require their lessees to make all repairs and replacements at their own expense, conditional upon a reduction in the rental rates charged by the Army and Navy.

Accordingly, OPA approved this arrangement on the condition that the maximum rates to the lessee will not exceed 85 per cent of the maximum rates in the Regulation. The 15 per cent reduction in rental rates will properly reimburse lessees for the portion of costs and repairs that would have been borne by the lessor, OPA said.

However, the action does not shift to the contractor the burden of repairing pre-existing or hidden defects that may become manifest and cause breakdowns while the equipment is in his hands.

The authority for the Government agencies to arrange for this method of leasing construction or road equipment was contained jn Amendment 13 to Maximum Price Regulation 134 (Construction and Road Maintenance Equipment Rental Prices and Charges for Operating and Maintenance or Repair and Rebuilding Charges), which became effective November 30, 1943.

You Can DRILL MORE HOLE With Bits

From your experience in drilling blast holes, you know you can get more hole with bits having longer body sections and deep, wide water courses.

Bucyrus-Erie bits have these and other features. They are cropped down to the toughest, strongest steel in the ingot, and forged to shape, thus refining the grain of the high quality bit steel used. They are easier to sharpen, and because of their long body sections will take more sharpenings and give longer service.

Try them on your job. You'll find that you can put down more hole, faster, with Bucyrus-Erie bits.

M11

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SOUTH MILWAUKEE, WISCONSIN

CONTINENTAL DIVIDE, TWO MILES UP

One of the LINN HAFTRAKS used on the difficult terrain of the Inter-American Highway.

THE LINN MANUFACTURING CORPORATION
MORRIS, NEW YORK

Oliver Plans Big Mine Stripping Program

A heavy mine stripping program on the Mesabi range this winter has been started by the Oliver Iron Mining Co., subsidiary of the United States Steel Corp. In the Canister district the program will include the Morrison and the Gross-Marble mines; in the Hibbing-Chisholm district it will include the Hull-Rust, Morris, Penobscot, Leonard-Burt, Hartley and Fraser Mines, and in the Virginia-Eveleth district the mine stripping will include the Mountain Iron, Rouchleau, Fayal No. 2 and Spruce mines.

Record Load Hauled Over Texas Roads

Recently a 21-passenger DC-3 transport plane, minus its outer wings and wing tips, was hauled from Houston to Dallas, Texas, a roundabout 340 miles by two six-wheel vehicles. It is reported to be the highest and widest load ever hauled over Texas highways. It measured 21 feet in height and 24 feet in width.

Canadian Highway Groups Organizing

Canadian organizations of highway users are moving toward formation of a "Canadian Council of Highway Users" which will be devoted largely to fact-finding and public relations work within the realm of highway users and to the promotion and preservation of highway transportation.

A.S.C.E. Elects Officers At Sectional Meetings

Vernon H. Smith, contracting engineer for the Virginia Bridge Co., was elected president of the Mid-South Section of the American Society of Civil Engineers at a recent meeting in Memphis, Tennessee. He succeeds J. M. Page of Little Rock, Ark,, who automatically became a director. Also elected were: vice president, John L. Saunders of Fort Smith, Ark.; secretary, Richard B. H. Shepherd, assistant,

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ABILITY ON WAR JOBS
Power . . . Speed . . . and Accuracy . . . are the essential requirements in wartime construction and of paramount importance in dragline operation. Koehring Draglines are reliable because they have the potentialities . . . speed . . . power . . . and accuracy . . . all so vital to wartime construction. Adverse working conditions in drainage districts and on defense projects have proven that the Koehring Dragline can be depended upon for essential dragline operation.
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• **Bulldozer in coral pit on two-lane road to a Munda airport. Note the army engineer "castle" insignia on the dozer.**
U. S. Army Signal Corps Photo.

engineer, U. S. Engineers, Memphis District; Mississippi director, James W. Brown of McComb, Miss., and Arkansas director, George L. Fry of Little Rock.

The annual gathering was attended by civil engineers from West Tennessee, Arkansas, Southeast Missouri, Southern Illinois and Mississippi.

L. C. Crawford of Iowa City was recently elected president of the Iowa Section of the American Society of Civil Engineers at a meeting in Des Moines. He succeeds Raymond Zack of Mason City. Frank Kerekes of Ames was named vice president, and L. O. Stewart, also of Ames, was elected secretary and treasurer. John Tippee of Des Moines and L. W. Malone of Ames were elected directors. A life membership was presented to Prof. R. J. Lambert of Iowa State university.

Watkins Kentucky Highway Commissioner

Kentucky's new commissioner of highways is J. S. Watkins, whose appointment was announced December 8th by Gov. Simeon S. Willis. Watkins, who resigned in 1929 as chief engineer in the Kentucky highway department, succeeds Richard G. Williams, Jr., in the commissioner's post.

Permit Use of Hadfield Manganese Steel

In view of the increasingly critical shortage of malleable iron, and the concurrent favorable position of manganese steel, the War Production Board issued an amendment to Limitation Order L-193 which now permits the use of Hadfield manganese steel in conveyor chains and sprockets and mechanical power transmission chains and sprockets.

The amendment also provides that references to the usage of rubber, formerly contained in the order, will now be dropped, as control over this commodity for use by the conveyor and power transmission industry is covered by Rubber Order R-1.

Order New Equipment For Embarrass Mine

New equipment, including four 5-cu. yd. Bucyrus-Erie electric shovels, 25 Dart trucks, three Caterpillar tractors and three Bucyrus-Erie churn drills have been ordered for delivery in 1944 by Pickands, Mather & Co. for its big mine stripping and water diversion job at the Embarrass iron mine on the Mesabi range.

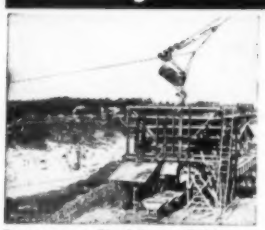
Clear Obstacles to Build New Scofield Dam

Clearance of legal obstacles which permit immediate construction of major features of the Bureau of Reclamation's Scofield project in Carbon County, Utah, for flood control and war food production, was announced by Secretary of the Interior Harold L. Ickes.

The new Scofield Dam will replace an old dam, built by private interests in 1925-26, which is in danger of collapse. The new dam will be an earth-fill structure, 56 feet high, 420 feet long, and 30 feet wide at the crest. The total estimated cost of the construction is $720,000, of which $393,000 is allocated to flood control.

The dam will stabilize the water supply for 12,500 acres of irrigated land of the Price River Valley, now faced

Big Savings



Sauerman Slackline Cableway digs sticky matrix from deep deposit and delivers 70 cu. yd. per hour to carloading hopper.

This picture shows a Sauerman Tower Machine equipped with a 2½ cu. yd. Crescent scraper bucket digging a flood control reservoir 3000' by 500' and piling the spoil to form an impounding dam.

By the SAUERMAN method of handling materials . . .

Where materials are to be moved distances of several hundred feet or more, a SAUERMAN Drag Scraper or Cableway can cut the cost per cubic yard to a low figure because it is able to dig, haul and place the material in a continuous, straightline operation, doing away with the expense of rehandling. The operation is smooth and rapid, producing large yardage with moderate expenditure of power.

The first cost of a SAUERMAN Machine is reasonable, maintenance amounts to very little, and the simplicity of operation makes it possible to place the control of even the largest installation in the hands of one operator. Moreover, the machine is very flexible, hence it is easy to adapt it to the exact needs of different jobs.

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Typical examples of pit and bank excavation, levee and canal work, handling coal and ore, deep dredging, stock-piling and reclaiming, etc., are illustrated in the Sauerman catalog. A copy of this booklet is yours for the asking.

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The CLEVELAND ROCK DRILL CO.

Division of The Cleveland Pneumatic Tool Company

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LEADERS IN DRILLING EQUIPMENT

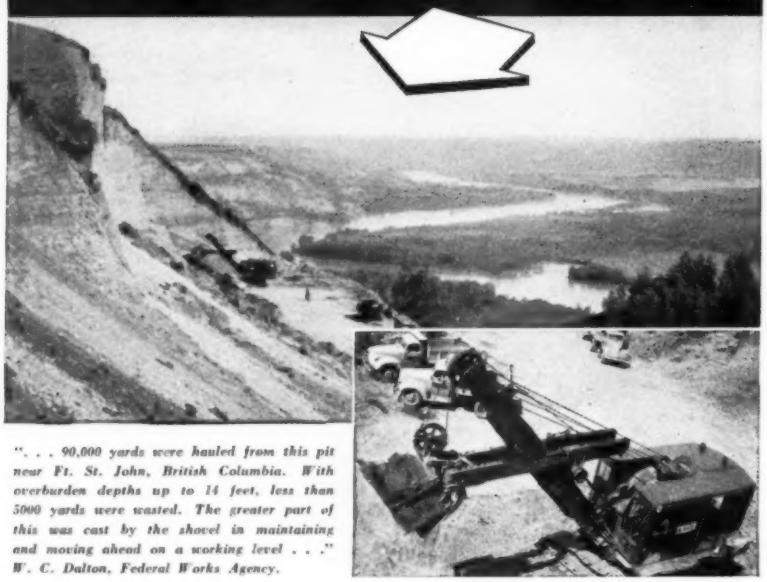
with shortages, and form the basis for providing supplemental water to the near-by Gooseberry project of 30,000 acres, when that project is authorized. Failure of the old dam would flood vital coal mines which are shipping to large steel plants and the main line of a major railroad, and would eliminate the supply of wafer for 12,500 acres of land producing war crops.

Consolidated Coppermines To Start Open Pit Method

The contract for removing the overburden from the ore deposit in the Tonopah claim of the Consolidated Coppermines Corp., at Kimberly, Nevada, in the Robinson mining district, has been awarded to the Isabell Construction Co. of Reno, Nevada. All mining in Coppermines holdings have been by the underground method until this time. The property was drilled a year ago.

• One of the first tractor equipment jobs—1914-1915—grading on the Maxe-Wren lands, Modesto, California. These two wheel scrapers were a cross between a fresno and a bottomless scraper, carried about seven cubic yards in good material, were controlled by air from a compressor on the tractor, and had a separate operator who rode the scraper. The tractors were 80 horsepower Holts (now Caterpillar) with half tracks and a "roller" wheel in front. The Maxe-Wren project involved leveling, drainage and road building on 3,000 acres. The land was preplowed with a disc plow to free the dirt for scraper loading. A subsoiler (shown left), the ancestor of the present-day ripper, was used to loosen the hardpan. T. R. Paulsen, at that time with Holt Tractor, supervised this installation.

ON THE ROAD TO VICTORY!



". . . 90,000 yards were hauled from this pit near Ft. St. John, British Columbia. With overburden depths up to 14 feet, less than 5000 yards were wasted. The greater part of this was cast by the shovel in maintaining and moving ahead on a working level . . ." W. C. Dalton, Federal Works Agency.

Wherever there are important rock, soil or sand-moving projects, you'll find OSGOOD performance "clearing the path" to speedier Victory. On the Alaska Military Highway — on all war fronts — Osgood ruggedness, power, free-action (measured air control) provide the *plus factors* so necessary for maintaining war-time job schedules.

Osgood's many duties "on the road to Victory" are providing new experience, skills and product developments for post-Victory machines. Investigate Osgood Today . . . to be ready for an earlier start Tomorrow!

Preventive maintenance keeps equipment digging in!
Digging deep to buy War Bonds maintains the attack!

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6 to 12 Tons
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THE OSGOOD COMPANY, Marion, Ohio

OBITUARIES

D. J. SHELTON

D. J. (Doc) Shelton, president and general manager of The Marion Steam Shovel Co. since October 16, 1941, died November 27th after a brief illness following a heart attack.

His valuable, rounded-out experience of 34 years of continuous service to the company he headed will be a great loss to The Marion Steam Shovel Co. His sudden death is a shock to his many friends and business associates.

Mr. Shelton was responsible for many important developments in material handling equipment and with originating practices recognized as sound by the excavating industry today.

SAMUEL W. MARSHALL

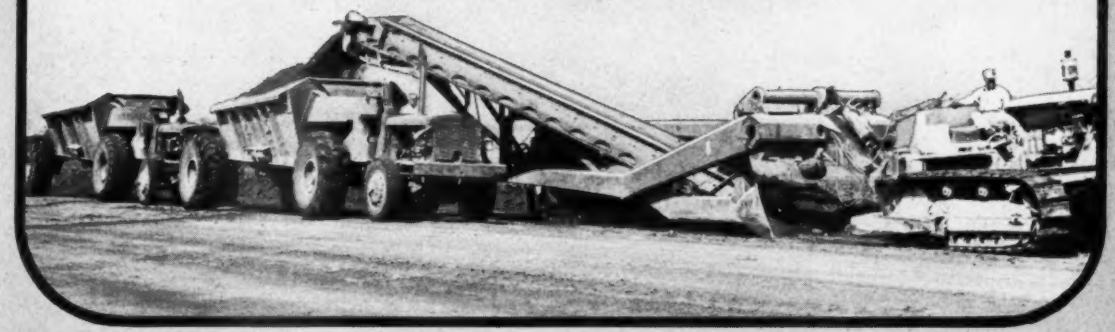
Samuel W. Marshall, 52, who was chief engineer in charge of construction of the Pennsylvania Turnpike, died Nov. 25 following a stroke at his home in Norristown, Pa.

As a member of the New York engineering firm of Parsons, Brinkerhoff, Hogan & McDonald, Mr. Marshall recently returned from Brazil where he supervised construction of an American air base.

Mr. Marshall was named chief engineer of the Pennsylvania Department of Highways in 1937 and later became one of the original members of the Pennsylvania Turnpike Commission. He served overseas as a captain in the First World War.

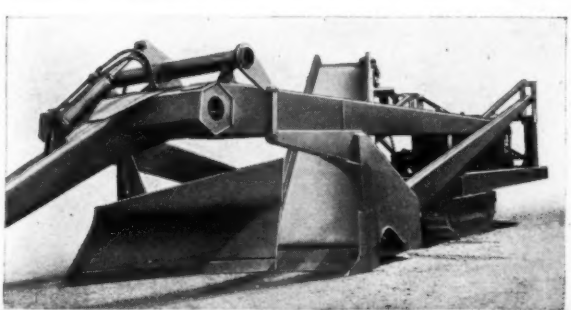
Surviving are his wife, Mrs. Mildred Y. Marshall, and a brother, William H. Marshall of Drexel Hill, Pa.

Here's a "POST WAR PRODUCT"



Ready for TODAY'S JOBS!

Backed by more than a year and a half of exhaustive tests and actual production operation, this new earth moving tool has proved its ability to load dirt faster and cheaper. The Model BV EUCLID LOADER is built to match the speed, versatility and efficiency of other Euclid equipment. It will load loose sand, gravel, shale, muck, heavy clay and other materials at lower cost and in shorter travel distance than other types of mobile loading equipment.



The wide 54" carrier belt is powered by a 150 h.p. engine and has a peak capacity of one ton per second. Diagonal mounting of the conveyor and high clearance of the delivery chute makes possible the loading of large hauling units in cuts as narrow as 32 feet shoulder to shoulder. Unusually long belt life is achieved by an effective cleaning mechanism and complete belt protection along the edges and at the cutting blade — material being loaded slides up the cutting edge and onto the belt rather than striking against it.

Write us or your nearest Euclid distributor for descriptive literature and specifications on this efficient earth loading unit.

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH . . ROCK . . COAL . . ORE

NOT in the *Contract*

Accompanied by a driver, an American major in a motor vehicle was stopped by the sentry on guard at a crossroad.

"Who goes there?"

"One American major, a one-ton truck of fertilizer, and one buck private."

They were allowed to proceed, but at every crossroad they went through the same formula.

After a time the driver asked if they were likely to be stopped again.

"I guess so," replied the major.

"Well, Major," said the private, "the next time we are stopped would you mind giving me priority over the fertilizer?"

She: "If wishes came true, what would you wish for?"

He: "I'm afraid to tell you."

She: "Go ahead you sap, what do you think I started this wishing business for?"

The lady journalist and author had just been introduced to the Hollywood magnate, and wanted to make a hit with him by discussing literature cleverly, so she said:

"You know, Mr. Goldberg, I just love Keats."

"Dot's fine," he said. "I'm always glad to meet a young lady vot lofs children."

She: "When we get married I'm going to cook, sew, darn your socks, and lay out your pipe and slippers. What more can any man ask than that?"

He: "Nothing, unless he's evil-minded."

"Daddy, do you think mother knows much about raising children?"

"What makes you ask that?"

"Well, she makes me go to bed when I'm wide awake—and she makes me get up when I'm awfully sleepy!"

"He got a discharge from the Army — drove a jeep I think"

Gregory, a U. S. Navy man, was medium-sized, and not very imposing. One night ashore he walked into a small honky-tonk bar, and with a flourish and a voice that filled the room, said: "When Gregory drinks, everybody drinks."

Immediately the bar was jammed, the house filled all the glasses, and everybody drank. Then with the impertinence of a king, Gregory reached into his pocket, pulled out a dime, laid it on the counter and said: "and when Gregory pays, everybody pays." And out he walked.

While on the subject of war, we simply can't pass up telling you about two hardy Gurkha soldiers, who had volunteered for service with India's sky troops. It seems they asked an N. C. O.:

"From what height are we supposed to jump?"

"Five hundred feet," was the reply.

"Nothing doing," they said, "it's too high. Can't we try from 300 feet?"

The N. C. O. explained that from such a low height there was a danger of the parachutes not opening in time, and the Gurkhas broke into smiles.

"Oh, that's different," they said. "We get parachutes, do we?"

WAC: "What's that ugly insignia on the side of the bomber?"

Pilot: "Sh-h-h, that's the commanding officer looking out of a porthole."

Working in a preparation plant, a man let his coat get caught in a revolving wheel.

He was whisked up and whirled round and round till the foreman managed to switch off the machine. The workman fell to the ground and up rushed the foreman.

"Speak to me, speak to me," he said.

"Why should I?" said the workman. "I passed you six times just now, and you didn't speak to me!"

A young RAF officer in Egypt was carrying out exercises in navigation and discovering his geographical position with sextant. After a series of involved and complicated calculations, he turned suddenly to his pilot and said, "Take off your hat."

"Why?" asked the pilot.

"Because according to my calculations we are now inside St. Paul's Cathedral."

Prospective Landlady: "How do you like the room as a whole?"

Crane Operator: "As a hole it's fine; as a room, not so good."

TIMKEN BEARINGS

HELP TO GIVE THE BUCYRUS ERIE 15-B *Profitable Performance*

Bucyrus-Erie 15-B Dragshovel digging ditch and setting concrete pipe. Owner, L. G. Defelice & Son, New Haven, Conn. This machine is equipped with 8 Timken Bearings—6 in the shovel and 2 in the Rockford Clutch.

Power shovels, like all other kinds of construction machines, are tools for profit; their value cannot be judged by first cost, but only by *earning power in relation to cost.*

Of course you would not buy any piece of equipment on the strength of its bearings alone; many other things affect performance and economy.

All other things being equal, however, the presence of Timken Tapered Roller Bearings is a sure guide to top-notch performance, combined with low operating and maintenance costs. Make "Timken Bearing Equipped" a "must" when buying. The Timken Roller Bearing Company, Canton, Ohio.

Fortify your equipment against post-war competition by redesigning to include more Timken Bearings.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Scooter-Trailer

Ralph Lloyd of Morrison-Knudsen Co. makes trailer for convenience in transporting Railway Motor Car

• **The scooter-trailer is hitched to Lloyd's car, ready to be hauled to the railroad tracks where the scooter will be rolled off the rear of the trailer, ready for use.**

That convenience, as well as necessity, is sometimes the "mother of invention" is demonstrated in the construction of a two-wheel trailer for the transportation of the railway motor car, or "scooter," used by Ralph Lloyd, Assistant General Superintendent of the railroad department of Morrison-Knudsen Company, who makes his headquarters at Salt Lake City, Utah.

In the pursuit of his duties of looking after the various jobs in progress along the Union Pacific Railway lines in Idaho, Utah, Wyoming, Nevada and Kansas, Lloyd found that it was very often convenient for him to make many inspection trips over the rail lines by motor car. It was a simple matter in the vicinity of his headquarters, but if the car was to be used at some distant point it was necessary to load and transport it on a truck.

Early this Spring, Lloyd, assisted by the mechanical force attached to the Kemmerer, Wyoming office of the Morrison-Knudsen Company, conceived the idea of constructing a two-wheel automobile trailer upon which the motor car could be loaded and towed to wherever he might need it. An old automobile front axle was cut in two and extended to the proper width to handle the motor car. The wheels were "dead-axed," or secured in a fixed position. Light-weight rails were then attached to the axle, mounted on springs as a common trailer frame. A tongue and hitch were added and the trailer was complete except for a device to secure the motor car in position on the trailer while being transported. This was accomplished by using two rods on each end of the trailer which hook over the axles of the motor car and which tighten by screwing into the frame of the trailer.

To load, the trailer is placed with the back end of the rails on the ground, the tongue extending in the air. The motor car is rolled on the rails constituting the frame of the trailer and the front end of the trailer is lowered until the rails are level. The motor car is then secured in place and is ready to be moved. To unload, the trailer is rolled up to the tracks, the locking devices released, and the front of the trailer is raised so that the motor car runs right off, onto the tracks.

Save MANPOWER with Brooks LOAD LUGGER

Your present truck, equipped with a Load Lugger, operated by one-man control, and utilizing 5 to 10 detachable buckets, can haul and dump as much yardage as 5 or 10 ordinary trucks . . . therefore releasing that number of drivers for other essential work. Today's vital equipment for industrial jobs or war contracts.

Write for CATALOG

Brooks EQUIPMENT AND MFG. CO.

301 Davenport Road, Knoxville, Tenn.
Distributors in all Principal Cities

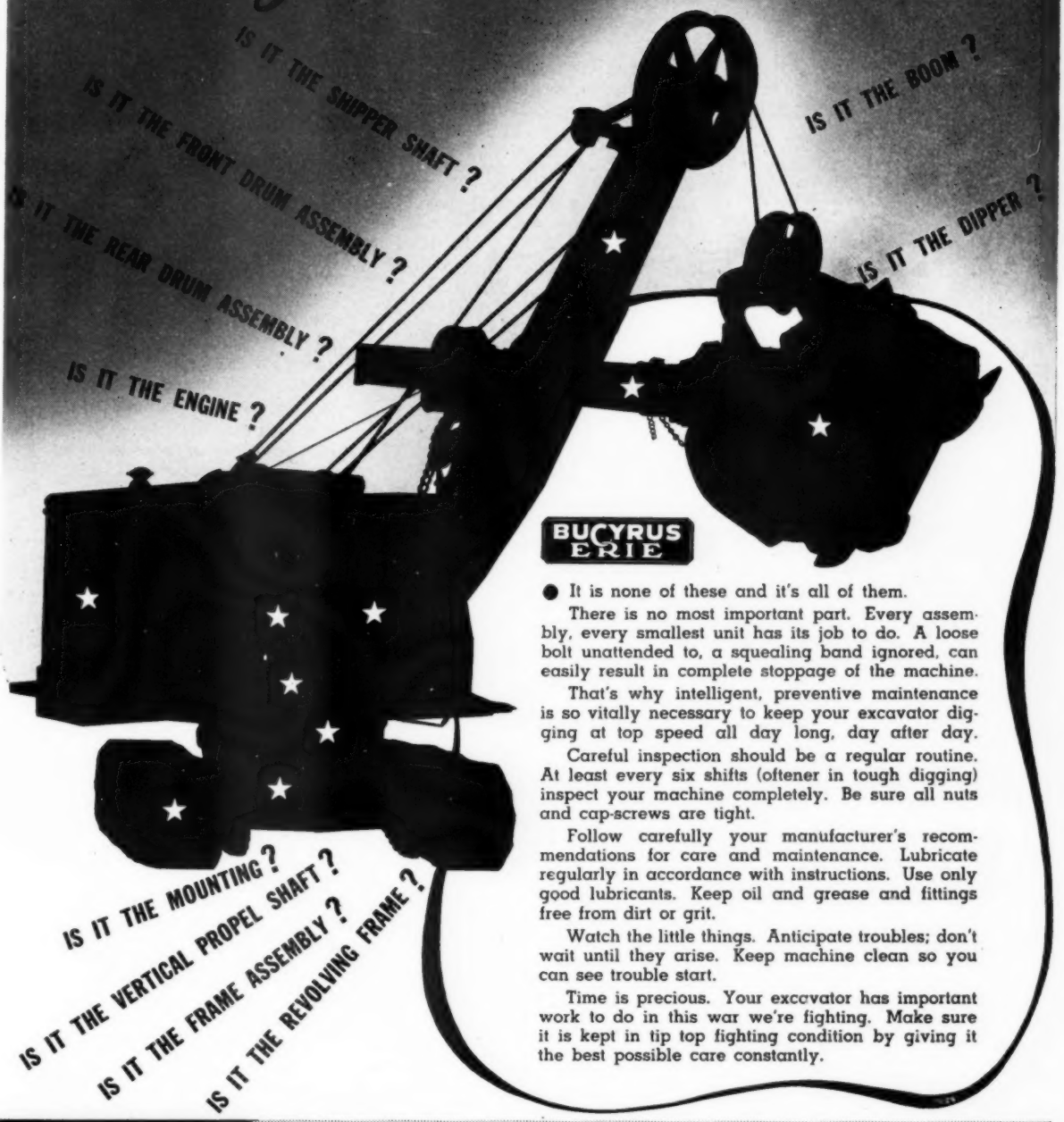
Tractor Equipment

(Continued from page 21)

power to load, and the ability, training, and "hustle" of the operator.

A word of caution may be advisable here in connection with estimating scraper output. Rated capacity of scrapers are not figured the same by different manufacturers and in many cases are extremely optimistic ratings when compared with actual output. Various makes differ materially in their ability to fill to capacity loads. Different types of material pack dif-

What is the Most Important Part of an Excavator?


IS IT THE SHIPPER SHAFT ?
IS IT THE FRONT DRUM ASSEMBLY ?
IS IT THE REAR DRUM ASSEMBLY ?
IS IT THE ENGINE ?
IS IT THE BOOM ?
IS IT THE DIPPER ?
IS IT THE MOUNTING ?
IS IT THE VERTICAL PROPEL SHAFT ?
IS IT THE FRAME ASSEMBLY ?
IS IT THE REVOLVING FRAME ?

BUCYRUS ERIE

● It is none of these and it's all of them.

There is no most important part. Every assembly, every smallest unit has its job to do. A loose bolt unattended to, a squealing band ignored, can easily result in complete stoppage of the machine.

That's why intelligent, preventive maintenance is so vitally necessary to keep your excavator digging at top speed all day long, day after day.

Careful inspection should be a regular routine. At least every six shifts (oftener in tough digging) inspect your machine completely. Be sure all nuts and cap-screws are tight.

Follow carefully your manufacturer's recommendations for care and maintenance. Lubricate regularly in accordance with instructions. Use only good lubricants. Keep oil and grease and fittings free from dirt or grit.

Watch the little things. Anticipate troubles; don't wait until they arise. Keep machine clean so you can see trouble start.

Time is precious. Your excavator has important work to do in this war we're fighting. Make sure it is kept in tip top fighting condition by giving it the best possible care constantly.

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

ferently and the pay load in one material may be considerably different from the pay load in another, even though the loads look about the same. Also in many organizations, we find the operators have not been trained to fill uniformly to capacity loads. This is a factor well worth watching and, in estimating a tractor application, it is always desirable to make actual measurements from time to time of the pay dirt carried in an average load until you **know** definitely what your equipment, with your operators, is carrying in your materials.

Two-wheeled Scraper

The two-wheeled scraper finds its greatest use on smaller jobs and in doing miscellaneous work on large jobs, such as back filling culverts, etc., where its back dump feature is an advantage. These units range from about 2½ to 5-yard capacity and require about 3,000 pounds drawbar horsepower per yard of capacity. 1,000 foot-haul is about the limit of their economical performance. Traveling speeds will be approximately the same as those given in connection with the four-wheel scrapers.

The post-war period is going to see a continued expansion of the use of scrapers on highway construction and airports. Their application to shallow stripping will probably also be widely extended.

Front End Loader

The front end loader (Dozer-Shovel or tractor shovel) is really simply a modified bulldozer blade with an extra high lift to permit raising material to a suitable height for dumping into trucks. Both cable and hydraulic units are available with the advantage in favor of the hydraulic because of its ability to use the weight of the tractor to apply down pressure to the dipper so that it can dig into harder material.

Sizes of tractor shovels run from ¼ to 3 cubic yard buckets with most applications in the ½ to ¾ yard sizes. This has proved a most economical unit for basement excavation, city street work, and in the material handling field for loading all kinds of bulk material from sugar beets to coal dust, aggregates, or cinders. City machines prove all-year-around handy men, loading leaves and refuse, snow and ice, sand and gravel, and also saving time on small excavating jobs normally done by the pick and shovel gang.

A good operator on a good ½ to ¾-yard tractor shovel can load out somewhere around 300 cubic yards or more in easy digging material in an eight-hour shift.

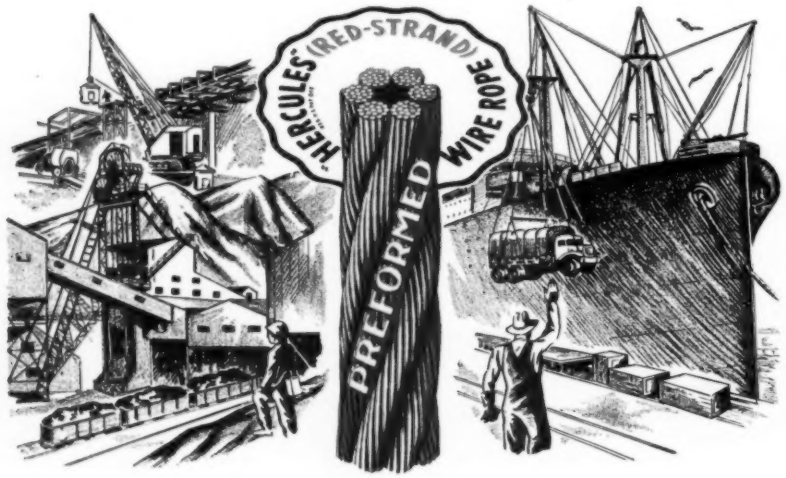
This type of shovel has a very low "ceiling" being about 12 feet high with bucket raised and only eight feet with bucket down in carrying position. This has permitted many interesting applications in enlarging basements, indoor loading of chemicals and other bulk materials, and also in tunneling and underground mining.

Our Dozershovel, now largely in use by the armed forces but recently announced for essential civilian use, offers extra application possibilities with a quick-change dozer blade to replace the dipper, and a crane hook useful in lifting and loading castings, rail, timber, pumps, etc.

The Tamping Roller

The tamping roller, or sheepsfoot roller, as it is sometimes called, is used to compact materials in a fill. The tamper is made up of single or multiple units of heavy, hollow cylinders, or drums, with projections, or feet, extending about eight inches from the surface. The arrangement of the feet on the drum is such as to provide for the distribution of the total weight on the minimum number

Dependable "PREformance



DEPENDABLE equipment is a means to efficient performance. This is one important "WHY" of America's magnificient production record.

Our own high standards in *every* phase of wire rope manufacture over a period of many years, has made it possible for our product to shoulder a greater share of the extra burden imposed by war. Preformed "HERCULES" (Red-Strand) Wire Rope is especially qualified for the difficult jobs. The inherent qualities of this time-tested rope, *plus* the advantages of Preforming—make for easier, quicker and safer work . . . more production from each pound of steel . . . greater efficiency.

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A. LESCHEN & SONS ROPE CO.
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of feet, thereby giving the maximum pressure on each foot. Hand holes and plugged holes are arranged in the ends of the drums so they can be filled with sand or water to increase the weight when greater pressure is desired.

As the tamping roller is pulled by a tractor over a layer of loose material, the feet penetrate, driving some of the surface down and compressing it so it will hold the weight of the roller. The tamper is pulled back and forth over the fill until the feet sink only partially into the surface. This action is as if one would start tamping from the bottom and come up. The impaction is affected by the speed at which the roller is hauled and the impact with which the feet strike the soil. Best results are obtained when a speed of between 2¼ and 3½ miles per hour is maintained. The moisture content and the types of soil used are of great importance. Tamping rollers will continue to be used in large numbers on earth fill dams, roadbed fills, or wherever heavy loads are to be carried on the fill or the fill is required to resist absorption soon after completion.

The benefits of tamping on earth fill are numerous and very important.

• On snow and ice removal the lifted blade shoves heavy banks back in steps if necessary. Ice yields readily to this sturdy unit built to cut and lift shale or seamed and broken rock ledges. Adjustable mushroom shoes protect the pavement from being caught at the cracks by the cutting edge.

Tamping makes it possible to lay down rigid pavement on a roadbed fill as soon as the sub-grade is finished, or to allow large amounts of water to accumulate behind an earth-filled dam soon after completion. In fact, it is the tamping roller that has made modern earth-fill dams possible. They have also overcome delays common to the old method of building a road where you first built up the roadbed, then covered it with gravel, and permitted it to settle through two or three winters before the rigid pavement could be laid. Even then you did not have as good results as can be had without as much delay by the tamping method. This speeding up of road construction is going to be an important factor leading to increased application of tamping rollers in post-war construction.

Use of the Ripper

The deep ripping scarifier, or "ripper" as it is commonly known, is a tool used for loosening material to be moved by tractors and scrapers, bulldozers or bullgraders. A ripper usually consists of a heavy T-shaped frame with rectangular holes through the crossbar of the "T" made to hold large teeth. The leg of the "T" is used as a tongue to hitch to a tractor drawbar. A pair of crankshaft mounted wheels are used to lower the teeth into ground to loosen the materials or to raise the teeth from the ground and thereby carry the ripper on its wheels and tongue when transporting it from place to place on the job. The ripper is a tool that all contractors using scrapers, bulldozers or bullgraders should have, as it not only

WELLMAN Williams Type BUCKETS

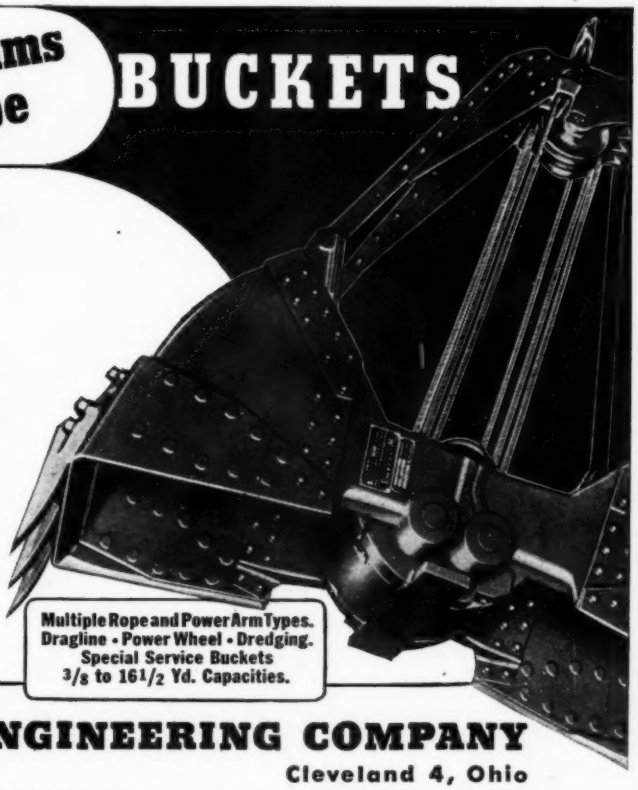
Welded Rolled Steel

FOR GREATER STRENGTH AND LONGER SERVICE

Wellman Buckets combine all the mechanical advantages of the famous Williams Bucket with the welded construction features formerly found in Wellman custom-built heavy duty steel mill buckets.

Send for Free Bulletin

Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN-WILLIAMS.



Multiple Rope and Power Arm Types.
Dragline • Power Wheel • Dredging.
Special Service Buckets
3/8 to 16 1/2 Yd. Capacities.

THE WELLMAN ENGINEERING COMPANY
7002 Central Avenue Cleveland 4, Ohio
SALES AND SERVICE AGENCIES IN PRINCIPAL CITIES

makes loading of the scraper easier in hard and stoney material, but it reduces, and sometimes eliminates completely, the drilling and blasting which otherwise would have to be done. Ripping the material also lessens to a very large extent the maintenance and depreciation of tractors, scrapers, bulldozers and bullgraders when working in hard digging. Working without using a ripper is like trying to dig with a hand shovel without using a pick.

The accumulated highway work of the war years, the development of national and international highways, the tremendous increase in commercial aviation, the construction required to catch up on a 15-year famine in the housing field, the revitalization of railroads, the increase in reclamation and development projects to feed and clothe a nation stepping up to a new high standard of living, the reconstruction needs of Europe and the Far East — all promise new high levels for excavating yardage. Perfecting tractor equipment design and applications means that a higher percentage of this yardage will be moved by tractor power with resulting relatively lower prices per yard.

We oldtimers have seen costs on tractor-type dirt jobs cut from the 50 cents to $1.50 range of the early 1900's to prewar prices that ranged as low as from 10 to 30 cents in many localities. And the cut has resulted in more work, more dollar volume, and MORE PROFIT for the contractor. Let's look forward with confidence to more of the same.

Amplidyne Control

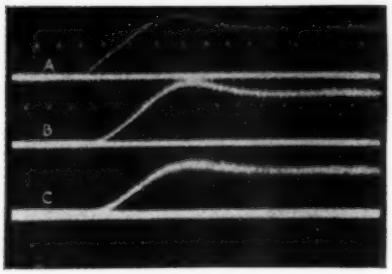
(Continued from page 15)

with its individual generators supplying power to individual motors for each motion, presents a good opportunity for the application of the amplidyne, in place of the usual magnetic control, to produce superior operating characteristics. After a number of field tests on shovels of various sizes, a comprehensive system of amplidyne control for shovel applications has been developed and is now available for use on electric shovels and similar excavating machines.

Elementary Circuit

The elementary connections for the amplidyne control as applied to one motion on an electric shovel are shown in Fig. 7. It will be noted that the characteristic shovel practice of connecting the d.c. motor and generator solidly together is continued. The amplidyne is provided with four fields:

1. A control field which is separately excited from power supplied by a constant-voltage exciter, which in this case is the same exciter that supplies power for the motor fields. The control field current is varied in direction and strength by the positions of the usual five-point reversing master switch.
2. A current-limit field which takes its power from the voltage drop across the commutating fields of the main motor and generator. The current-limit field circuit comes through a bias connection which provides for adjustment to withhold the current-limiting action up to any desired current value. The current-limit field (in some applications) is also wired through a resistor in series with the amplidyne armature output in such a way that the current-limiting action when motoring, is slightly weakened at higher generator voltages.
3. A stabilizing field which is excited by the amplidyne output voltage in such a manner as to prevent the amplidyne voltage from fluctuating more rapidly than the load conditions demand.
4. A compensating field, the strength of which is adjustable by means of a paralleling resistor. The strength of this field determines the maximum amplidyne output current at any given voltage and thus a means is provided for limiting the maximum excitation which the amplidyne will furnish to the generator main fields.



• Oscillograph showing response of amplidyne to control transients, indicating the speed of voltage build-up. (A) Control field current, 60 cycle tuning wave. (B) Short circuit axis current. (C) Load volts.

Neutralizing contactors are provided in the current-limit and stabilizing field circuits to insure that the equipment will come quickly and smoothly to rest when the controller is brought to the OFF position, and to prevent any creeping or circulating current when the controller is at the OFF position. A plugging relay, PR (in Fig. 7), may be provided to control the speed-torque characteristics in the regenerative quadrants. This is especially desirable on the swing motion where the inertia involved is large.

Fig. 8 shows the various characteristics which may be obtained. Curve A shows the characteristics in the four quadrants when the PR relay and the resistor associated with it are not

So Inexpensive
You Can Use Them Freely!

Simplex Screw Jacks. 19 sizes with 4-hole head; 9 sizes with ratchet head. 8¾" to 23" high; 4" to 14¼" lift; 5 to 30-tons capacity.

The contractor on a roof raising job ordered 204 Simplex Screw Jacks which more than paid for themselves on this job alone. At a low cost, these screw jacks provide such features as a single large chrome-moly ball bearing under the forged steel cap which reduces friction 88%, and a non-breakable malleable iron base with safety peephole to prevent over-extension of screw.

Templeton, Kenly & Co., Chicago (44), Ill.
Better, Safer Construction Jacks Since 1899

Save On Every Construction Job!

There are scores of Simplex Jacks to lick tough lifting, tensioning, pulling, shoring and leveling jobs. Send for Catalog 44.

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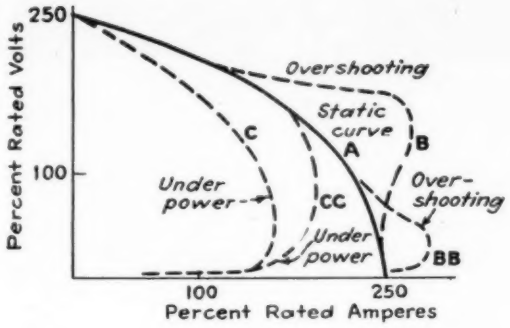
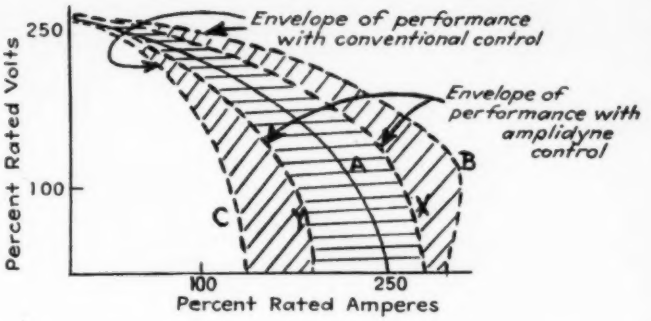
Jacks





• Right. The working characteristics of the conventional three-field shovel generator does not follow its test volt-ampere curve very closely when changes occur in the load or in the separately excited load field. Instead, the generator lags and causes "overshooting". Also, because of the relatively large time constant of the generator field, the voltage built up will lag and full accelerating current and torque will not be attained. "A" is the steady state curve; "B" and "BB" represent overshooting and "C" and "CC" represent underpower. Above: This shows a possible limiting zone of overshooting and underpower between curves "B" and "C" for a generator on a shovel hoist motion.

used. Curve B shows the characteristics when the resistor is used but the PR relay is not used. Curve C shows the characteristics when both the resistor and the PR relay are used. It should be understood that the slopes of the various curves shown may be changed at will by changing the values of the bias circuit resistors and the other resistance factors in the current-limit field circuit. The no-load voltage on the main generator is readily adjustable by means of the resistor in the compensating field shunt circuit. The stalling current is adjustable (independently in both directions), by adjustment of the bias resistors.

While the characteristic curves shown in Fig. 8 are in terms of volts/amperes, it should be understood that, since a separately excited motor is used, the speed/torque characteristics at the output shaft of the main d.c. motor will be almost exactly the same in that the speeds will be practically directly proportional to voltage values and torques will be almost directly proportional to the current values.

Advantages

A considerable number of practical advantages have resulted from the application of the amplidyne to electric shovel control. These have been demonstrated in the operation of the Foley Brothers', and several other large shovels on which the amplidyne control is now in service.

"Overshooting" and underpower have long been a problem to the designer of electric equipment for shovels. The amplidyne, with its fast, forcing action, provides a means for better control of these undesirable conditions. Fig. 9 illustrates graphically and qualitatively the effect of amplidyne control on these characteristics.

With dynamic characteristics held more closely to the static or designed characteristics, more power, and consequently faster operation, is available on acceleration. On deceleration, such as when sudden and unforeseen obstructions are encountered in digging, "overshooting" is reduced, with consequent reduction of injurious electrical and mechanical stresses.

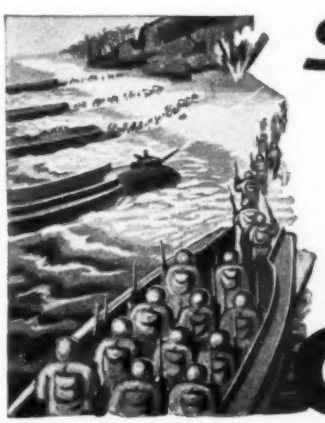
The operation is made smoother than with other means of control since the amplidyne's control of the speed/torque characteristics is continuous and rapid. Power and torque peaks may be reduced without materially affecting performance characteristics.

The multiplicity of contactors involved with the conventional magnetic type of control is largely eliminated, and the control and excitation power circuits are simplified. Maintenance in connection with generator field control contactors is eliminated.

The speed/torque characteristics may be more closely designed to take full advantage of the voltage and commutation characteristics of motors and generators. This may result in higher speeds and faster operation.

Faster operation, together with more continuous operation resulting from decreased electrical and mechanical maintenance, produces increased output.

A rather complete set of oscillograph tests was made a few months ago to secure a reliable comparison



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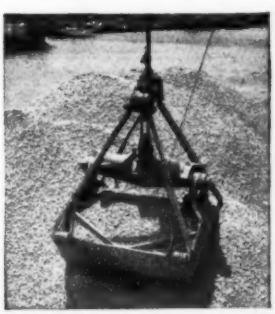


OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

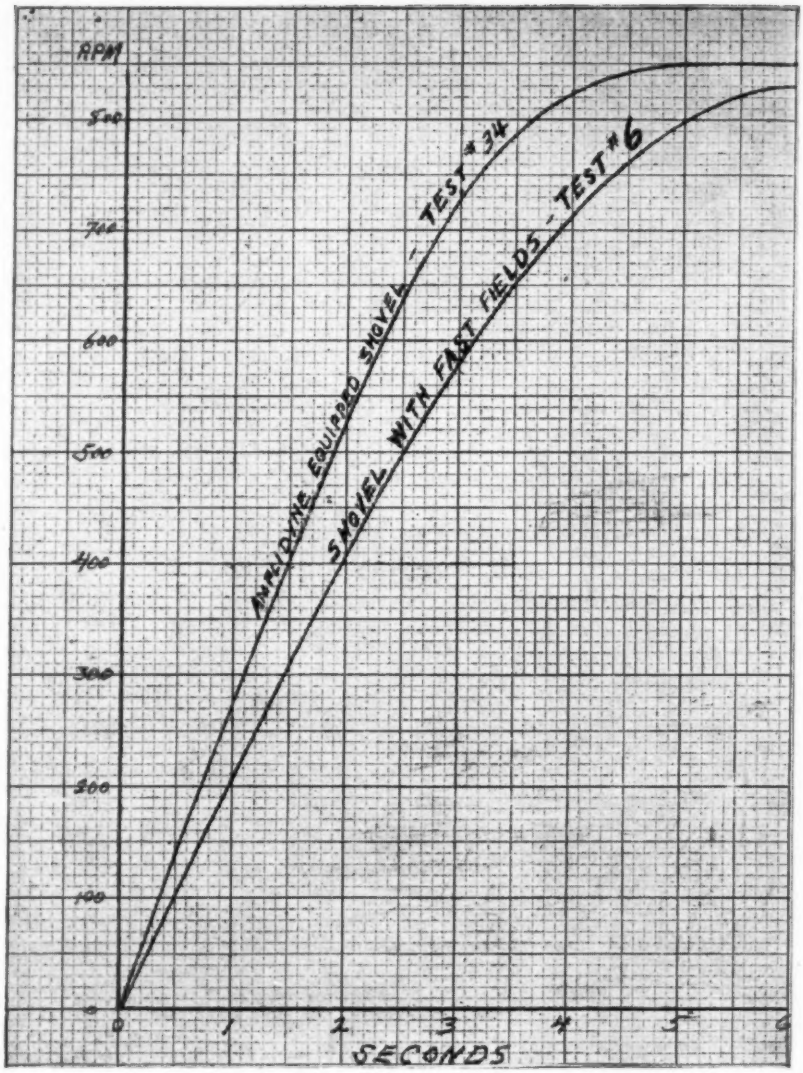
of the performance of a shovel equipped with amplidyne control with that of a similar machine with conventional control. The results indicated very clearly the smoother, faster operation of the amplidyne equipped machine. Fig. 10 shows curves made on the basis of oscillograph tests, and indicates the nature of the advantages found for the amplidyne control. The advantages in speed were found to be most pronounced on the hoist motion.

Applied to Old Machine

While it is a relatively simple matter to apply the amplidyne control to new machines this new development may also in certain cases be applied to old machines. Many old machines equipped with manual, drum-type control, and possibly series wound d.c. motors, are badly in need of modernization. On such machines, the change from the conventional three-field control to the amplidyne control, and the change from series-wound motors to separately excited motors (change in motor fields only), should result in a considerable improvement in output due to smoother and more continuous operation. In every case a change of this nature should be made only after careful study has indicated that the electrical changes can be coordinated with the mechanical requirements.

The experience of a mid-western coal mine where a trial installation of amplidyne control was made only on the hoist motion of a large stripping shovel is a concrete example of increased output. The yardage records on this machine showed that during the time the amplidyne control was being used, the machine actually moved more dirt than during the same length of time just preceding the test period, this notwithstanding the fact that the bank was slightly higher and the rock content somewhat greater during the test period with amplidyne control.

Demonstrated advantages when applied to the larger units and the several recent improvements in device arrangement lead to the conclusion



• Curves, made on the basis of oscillograph tests, indicate the nature of the advantages found for the amplidyne control. The acceleration curves, of hoist motors with dipper loaded, are of amplidyne control and three-field conventional magnetic control.

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AMERICA'S shipbuilding industry will launch more ships in 1943 than all the rest of the world combined.
ROGERS TRAILERS are a vital link in the mass-production method of ship construction for they are transporting heavy machinery . . . boilers, bulkheads, engines . . speeding Victory ships down to the sea!

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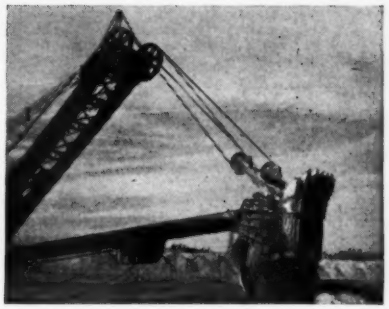
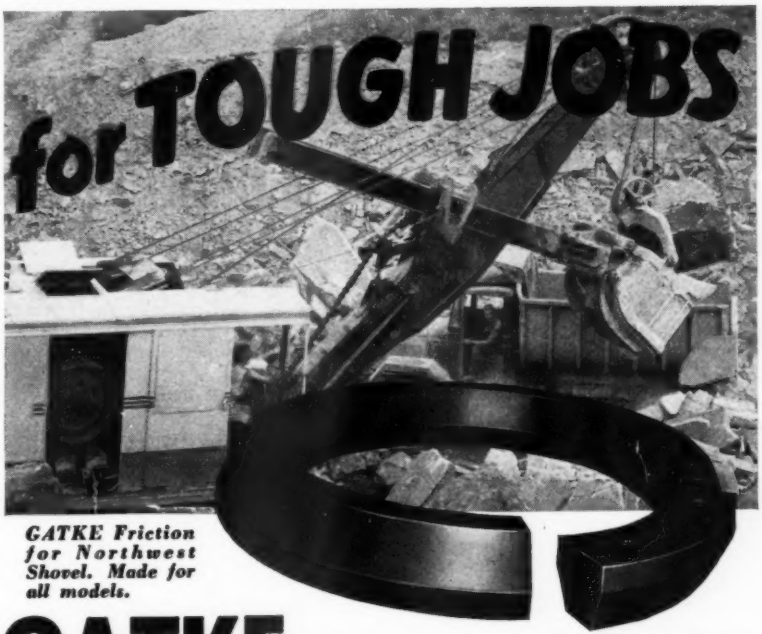


• Amplidyne control makes for faster, smoother action in the three principal motions of a shovel, digging, swinging, and dumping. The advantages in speed are found most pronounced on the hoist motion. Amplidyne also provides a better means of controlling overshooting and underpower.

that eventually the amplidyne control system may largely replace the conventional magnetic three-field variable-voltage type.



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GATKE CORPORATION
232 N. LaSalle St. Chicago 1, Ill.

Post-war Planning

(Continued from page 23)

and maintenance, as well as for the replacement and repair of war-worn roads. If private enterprise is not ready to take over the job when the war ends, then government agencies must step in to do so to help keep economic stabilization in the country.

Indications are that there is a need for the advancement of more federal funds to state units and their local governmental sub-divisions to stimulate planning. A sharp decrease in the amount of automobile registration fees and declining gas tax revenues during the war years will leave many states without sufficient funds to plan and carry out the huge repair and new construction program facing them. Federal funds to tide the state highway departments over at least the first year after the war, until additional revenue comes in from new car registrations and the pre-war level of highway use, is sorely needed.

Florida's Road History Starts Before Pilgrims

Florida takes pride in its road-building history which began in 1565. The Sunshine State's first road from Fort San Marco at St. Augustine to Fort Carolina on the St. Johns River east of Jacksonville was being traveled more than half a century before the Pilgrims landed at Plymouth Rock and it is believed that portions of the original right-of-way are now a part of State Highway No. 4 (U. S. No. 1) running down the East Coast.

The principal motive behind the building of this road was the same as the current urge for construction of highways in Florida today—to make accessible military posts for the protection of the country.

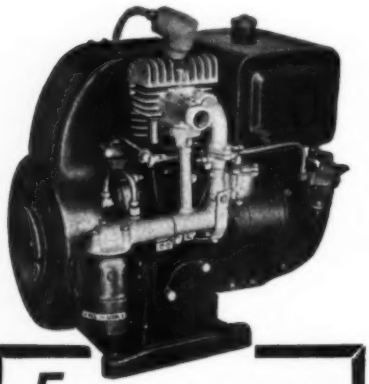
The first highway of importance was between St. Augustine and Pensacola which later became known as the Old Spanish Trail.

New trade literature

Title: "Pipe and Tube Bending Handbook"

Subject: A new and complete treatise showing methods and devices for bending pipes and tubes of copper and its alloys. It contains 80 pages of text with 113 figures and illustrations, including 35 full pages of unit weights of tubes of different alloys with varying diameters, wall thicknesses and shape, as well as pertinent information on the chemical and physical properties of such pipe material.

Where to Get: Copper and Brass Research Association, New York, New York. (Free)



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Awarded to each of the four Onan manufacturing plants.

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Title: "Lubrication and Maintenance Guide For Contractor's Equipment"

Subject: A well prepared handbook tells how to lubricate and maintain engines, air-cleaners, oil filters, ignition systems, open gears and many other units of construction equipment. The 63 page book is protected by a heavy cover.

Where to Get: Contractor's Sales Department, Gulf Oil Corporation, Gulf Building, Pittsburgh, Pennsylvania.

Title: "The New Fairbanks-Morse Protected Polyphase Squirrel-Cage Motor"

Subject: This 12 page bulletin is printed in two colors and is well illustrated. Features of the design are brought out clearly in brief text. Specifications and "motor characteristics" are included.

Where to Get: Fairbanks-Morse and Company, Chicago, Illinois, free upon request, ask for bulletin 1160.

Title: "Cavalcade of Fighting Horsepower"

Subject: A 16-page booklet giving a graphic portrayal of the part "Caterpillar" products are playing in World War II. Important chores on many fronts, including the Aleutians, Africa, Arctic, New Guinea, Great Britain, Mediterranean, and New Caledonia are pictured and described.

Where to Get: Caterpillar Tractor Co., Peoria, Ill. (Free)

Title: "Automobile Facts and Figures"

Subject: The yearbook of the Automobile Manufacturers Association graphically showing how the industry has stepped up its annual production rate to double the output of civilian goods in the best peacetime year. In this, its 25th annual edition, Automobile Facts and Figures reveals that there are 1038 automobile plants in the country engaged in war work. The extent to which the industry subcontracts its war work is also shown; 56 cents out of every $1 received goes to subcontractors.

Where to Get: Automobile Manufacturers Association, Detroit, Michigan. (Free)

Title: "Manganese Steel for Mines and Quarries"

Subject: Manganese steel and its relationship to the mining and quarrying industries is the subject of a 60-page bulletin issued by the American Manganese Steel division of the American Brake Shoe Company. It presents the case of the "toughest steel known," giving convincing support to the thesis that production and handling equipment will produce more continuously and last longer when equipped with wearing parts made of this abrasion and stress resisting steel. The booklet describes the origin of manganese steel and the properties which give it exceptional toughness and wear resistance. The book deals extensively with wearing parts for equipment used in metal mines, non-metallic mines, quarries and sand pits, such as power shovel dippers, dipper teeth, apron feeders, pumps, screens, wheels, sheaves, chains, etc.

Where to Get: American Brake Shoe Company, Chicago Heights, Ill. (Free)

Title: "Salvage Manual for Industry"

Subject: Two hundred and forty-five pages of systematically organized and classified information and data —most of it "how to do" nature—on industrial salvage practice in all its ramifications. Material is presented in 26 chapters, grouped into six major sections. There are two chapters on organizing and planning the salvage department; three on the administrative factors; 12 on methods of handling metal scrap; three on non-metallic waste; seven case histories demonstrating exemplary practices; a 17-page compilation of practical hints for handling specific waste materials, and a nine-page index.

Where to Get: E. F. Mulligan, Salvage Division, WPB, Washington, D. C. (Free)

Title: "Sinews of Industry"

Subject: This book tells the story of how wire rope is made and shows many different types. Sections of the book deal with care, splicing, fitting, and socketing.

Where to Get: Wire Rope Corporation of America, New Haven, Connecticut. (Free)

Title: "New Ideal Handbook"

Subject: Tells how to keep motors and generators operating continuously at peak efficiency without dismantling.

Where to Get: Ideal Commutator Dresser Co., Sycamore, Illinois. (Free)

Title: "Maintenance and Care of Clamshell Buckets"

Subject: A 20-page booklet in color, liberally illustrated with photographs and diagrams of parts and assemblies, on the maintenance and care of clamshell buckets.

Where to Get: Blaw-Knox Company, Pittsburgh, Pa. (Free)

Title: "Balco Products"

Subject: The latest bulletin of the company giving a description of the various marine, industrial and refinery products it manufactures and the services it performs.

Where to Get: Ballou Service and Instrument Co., Inc., New York (Free)

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

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FOR SALE

Shovel attachment complete for Bucyrus-Erie 37-B 1½ yd. machine. Excellent condition. Dipper just equipped with new Amsco dipper body. Contact Brandeis Machinery & Supply Co., Brook & Warnock Sts., Louisville, Ky.

BUSINESS OPPORTUNITY

Can you move 2,000,000 yds. dirt per season. 65' deep. Coal stripping. Long term contract if desired.

DAKOTA COLLIERIES COMPANY
1506 Foshay Tower Minneapolis 2, Minn.

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Twin rope crowd shovel equipment for late Model Bucyrus-Erie 10-B. Never used. Located Chicago. Box 3007

Wiley Whirley Model 75, 440-volt, 3 phase, 60 cycle; 75' boom; now equipped for dragline operation with 1½ yd. bucket. Rail mounted; 11' gauge. Rated approximately 20 tons at 12'. Located northern Michigan. Box 3002

6—15 yd. cat wagons, bottom dump, 2 compartment. Located near Chicago. Box 2994

50-B SHOVEL FRONT

Shovel front end for 50-B steam machine. 26 ft. boom, 17 ft. dipper stick, and 2 yd. dipper. Will sell for $1000 cash f.o.b. mine. Pittsburg, Kansas district. Box 2995

FOR SALE

One 4-yard and one 5-yard Hendrix dragline buckets, light weights. Both in good condition. Located Arkansas. Box 3001

FOR SALE

1942 Anthony 3-yd. Hydraulic P.T.O. Dump bed.
E. D. Richardson & Sons Mfg. Co.
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4—Waukesha Model WAL Gasoline Engine 6 Cyl. —5¾x6½—148 H.P. @ 1080 R.P.M. Idling Speed—1013 cu. in. piston displacement.

1—Hercules Model WXC-3 Gasoline Engine 6 Cyl.—4¼x4½—75 H.P. @ 1575 R.P.M. Idling Speed 383 cu. in. piston displacement.

2—Wisconsin Model M-4-A Gasoline Engine 6 Cyl.—5¼x6—117 H.P. @ 1230 R.P.M. Idling Speed 779 cu. in. piston displacement.

8—Buda Model 4 DT-226 Diesel Engine 4 Cyl.—3¾x5⅛—37.5 H.P. @ 1410 R.P.M. Idling Speed 226.4 cu. in. piston displacement.

4—Buda Model HP-351 Gasoline Engine 6 Cyl.—4-13/16x5½—55 H.P. @ 1490 R.P.M. Idling Speed 351 cu. in. piston displacement.

4—Int. Harvester Model UD-9 Diesel Engine 4 Cyl.—4.4x5.5—49 H.P. @ 1325 Idling Speed 334 cu. in. piston displacement.

4—Int. Harvester Model UD-9 Diesel Engine 4 Cyl.—4.4x5.5—52 H.P. @ 1490 R.P.M. Idling Speed 334 cu. in. piston displacement.

F.O.B. Erie, Pa.

Write for any further information desired and for prices and details concerning additional accessories available for SOME of the above engines.

Bucyrus-Erie Company Parts Department **South Milwaukee Wisconsin**

FOR SALE

Partial clamshell equipment for 30-B machine consisting of an auxiliary drum unit complete with hand ram and operating levers. Box 3000

FOR SALE

One Universal Lorain 10-ton 4-wheel trailer in very good condition; 2 new tires and 6 really good tires. Also one Fordson 5-ton 3-wheel roller. Earl Dennis, 8810 Tobey Ave., Affton 23, Mo.

CLAMSHELL BOOMS

Two booms for Bucyrus-Erie 43-B or 44-B machines available as surplus equipment of New York City contractor. No tagline equipment. In good condition. Box 3004

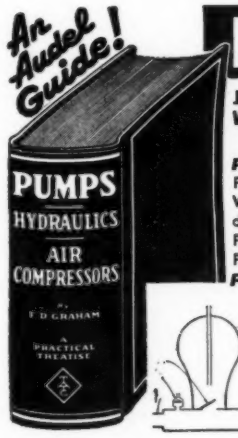
Ragland Roller, Farmall tractor with steel front wheels and sheepsfoot tamps built on 80" wide rear wheels. Appropriate fenders and lights and anti-overturn attachment. Machine passes North and South Carolina highway specifications.
Neal Hawkins, Gastonia, North Carolina.

FOR SALE

Front end of Lima Crane, complete, boom, dipper sticks, dipper, drum laggings and cables. Has been but slightly used.
P. O. Box 801 Klamath Falls, Oregon

FOR SALE

18-ton Vulcan Locomotive, 42-inch gauge, in good working condition. Located at Pittsburg, Kansas. Box 2996



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Class 14 Steam Dragline centrally located, reasonably priced. Box 2999

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Used model 4160 electric shovel, centrally located. Box 2997

FOR SALE

Bucyrus-Erie 10-B single motor electric tunnel shovel for 3 phase, 60 cycle, 440 volt AC; equipped with 11' boom, 10' handle, ⅝-yard dipper. Located Chicago. Available immediately. Box 3008

WANTED

Need 6 to 10 yd. dragline—150' boom or other machine capable of stripping 65' of dirt. Also experienced operator. Buy or rent.

DAKOTA COLLIERIES COMPANY
1506 Foshay Tower Minneapolis 2, Minn.

WANTED TO BUY

Bucyrus-Erie 10-B shovel in good operating condition. Must be located in mid-west for shipment to northern Wisconsin. Write or wire in care Excavating Engineer. Box 3009

WANTED

1½ yd. shovel. Gas or diesel—prefer Lorain. Give full particulars in first letter. Tel. 1994. W. L. McIntosh, DuBois, Pa.

WANTED

3 yard Diesel dragline 80 to 100' boom, 2 yard Diesel shovel, ½ yard shovel, bulldozer, and 3-10 ton dump trucks. Box 3006

Two "Caterpillar" DW-10 tractors and W-10 wagons or Euclids of approx. same capacity. Must be A-1 condition and late models. J. L. Shiely Co., Inc., 1101 N. Snelling Ave., St. Paul, Minn.

WANTED

6 to 12 yd. cap. stripper shovel or walker dragline.

R. C. Stanhope, Inc., 60 E. 42nd St., New York, N. Y.

WANTED

Shovels—¾ to 2½ yards.
Draglines—1½ to 6 yards.
Frank Swabb Equipment Co., Hazleton, Pa.
Telephone: 3906

Notes from the manufacturers

Blaw-Knox Company, Pittsburgh, Pennsylvania, announes the addition to its executive staff of Mr. Frederick Baker, who has been appointed assistant treasurer.

E. I. Du Pont de Nemours and Company, Inc., Wilmington 98, Delaware, announces that Charles B. McCoy has been named director of sales of the Explosives division of the company. Mr. McCoy succeeds Samuel G. Baker, who has been made manager of the company's electroplating division.

Westinghouse Electric and Manufacturing Company of East Pittsburgh, Pa., announce the appointment of Peter L. Lenz as manager of the Middle Atlantic District Manufacturing and Repair department.

Hercules Powder Company of Wilmington, Delaware, announce the appointment of Paul J. Weber to the position of assistant treasurer. Mr. Weber is an economist and head of the economic research department of the company.

The B. F. Goodrich Co. of Akron, Ohio, announces that Chester F. Conner has been named assistant general manager, and Fred Lang, merchandise manager, of the industrial products sales division.

The Foote Co., Inc. of Nunda, N. Y., manufacturers of the Multifoote paver, has recently been awarded the Army-Navy "E". This is the first award of its kind made to exclusive manufacturers of pavers.

Davey Compressor Company of Kent, Ohio, announces the Wentz Equipment Company, Topeka, Kansas, as a new franchise dealer to handle Davey portable and industrial compressors, truck power take-offs and pneumatic saws. The E. H. Kliebenstein Company of New York City and Curry Equipment Corp. of Philadelphia, Pa., also have added the Davey line.

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Address all box numbers c/o EXCAVATING ENGINEER South Milwaukee, Wis.

DRAGLINE-SHOVEL OPERATOR

Thirty-one years old; 4-F Selective Service classification. Interested in operating machines in foreign country. Now located Indiana. Box 9219

ALL-ROUND OPERATOR

Twenty years experience on heavy equipment including operation, repair, overhauling and rebuilding of cranes, shovels and draglines, all makes, gas and diesel. Now employed temporarily as Master Mechanic advisor. Age 38; Selective Service classification 3-AH. Interested in permanent position. Located Ohio. Box 9220

SHOVEL-DRAGLINE OPERATOR

Six years' experience on Lorain, Marion and Koehring one- and two-yard shovels and draglines. Age 30; married; 4 children school age. Wants steady work anywhere in U. S. References. Can handle ordinary repairs. Available immediately. Located Wisconsin. Box 9223

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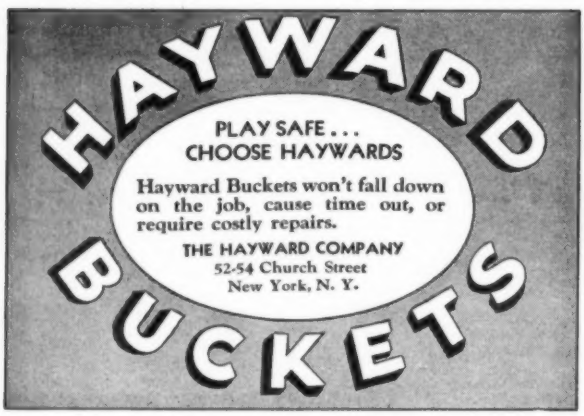
Twenty years' experience on Northwest, Speedcrane and P&H cranes. Also has operated coal yard bridges and towers. Age 37; Selective Service Classification 2-B. Married; 2 children. Can make own repairs. Wants job in permanent location. Willing to go anywhere. References. Now located Wisconsin. Box 9222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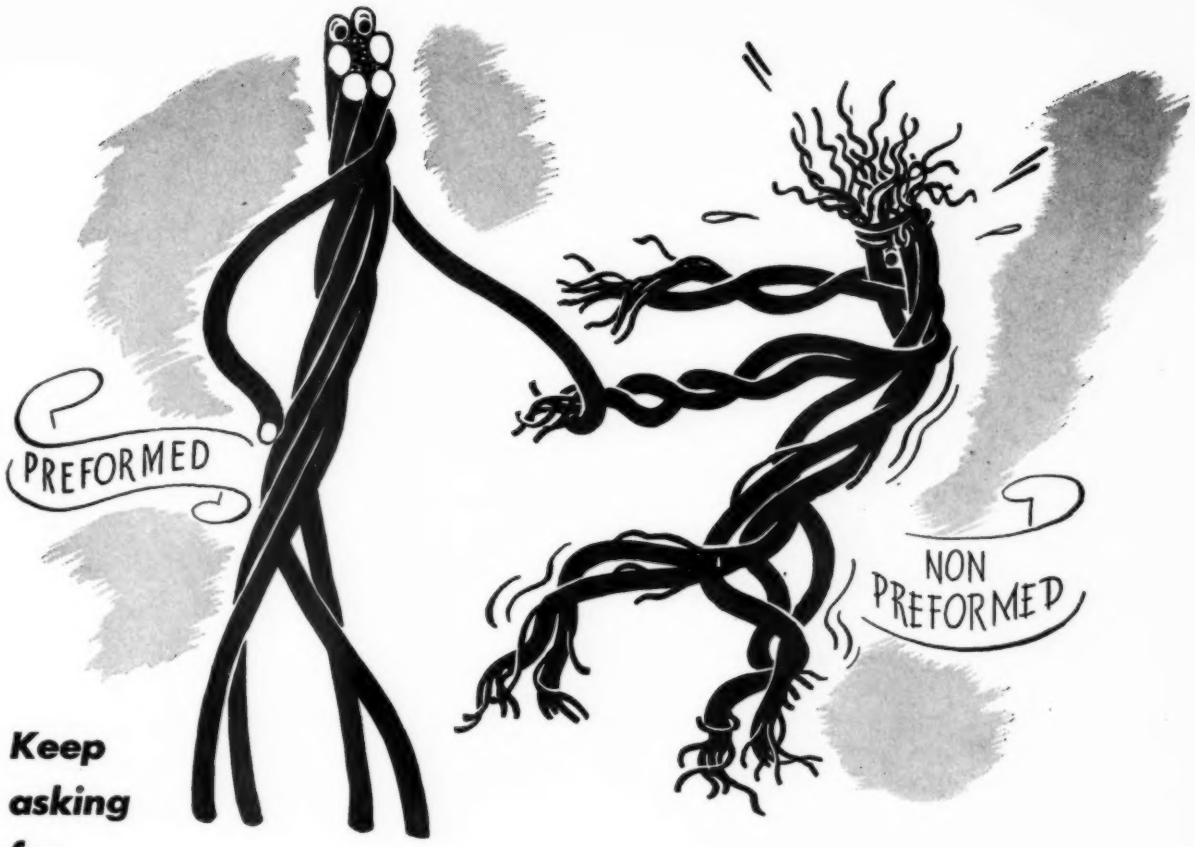

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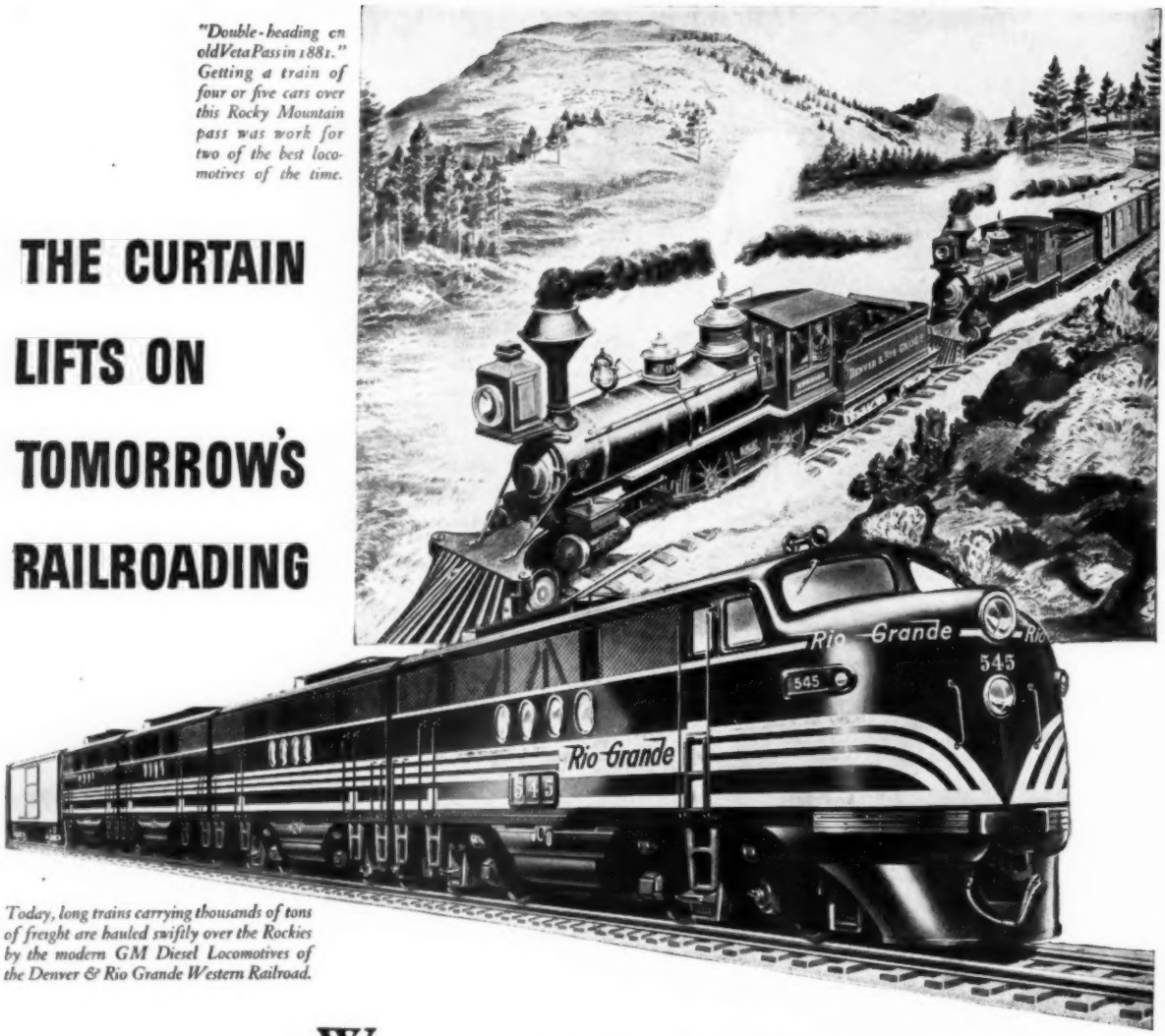

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